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CONTENTS.

An Asterisk (*) denotes an illustrated article.

New England Association of Gas Engineers—Official Notice..... 49

EDITORIALS—

Health Commissioner Raymond's Report..... 49
The Petroleum Outlook..... 50
Growing Competition of the Gas Engine..... 50
Sixth Annual Meeting of the Western Gas Association—Official Report..... 51
The Management of Small Gas Works..... 58
A Drop of Blood..... 58

ITEMS OF INTEREST FROM VARIOUS LOCALITIES..... 59

The Bower-Grimston Regenerative Gas Burner—If They had all Done as Well—Improvements at the New Castle (Pa.) Gas Works—Service Pipe Fused by an Edison Illuminating Wire—Gas Matters in Toronto, Canada—Gas Explosion in San Francisco—New Works at Lindsay, Ontario—Electric Light for Richmond, Va.—Stockholders Getting Uneasy—Fond du Lac's Towers Heard from Once More—Price of gas reduced in Oshkosh, Wis.—Troy (N. Y.) in Darkness—Fire at the Works of the Yonkers (N. Y.) Gas Light Company—It did not Last Long—The Pintsch System of Gas Lighting—Electric Light for Rochester, N. Y.—Pipe for the Philadelphia Gas Trust.

The Market for Gas Securities..... 60

CORRESPONDENCE—

Eighteen Year Old Journalists..... 60
Letter from Valparaiso, S. A..... 60

[OFFICIAL NOTICE.]

New England Association of Gas Engineers.

BOSTON, July 28, 1883.

The semi-annual meeting of the Association, which is usually held in August, will be dispensed with this year. GEORGE B. NEAL, Secretary.

HEALTH COMMISSIONER RAYMOND'S REPORT.

In the beginning of April of this year the following communication was sent to Health Commissioner Raymond by the Committee on Lamps and Gas of the Common Council of the City of Brooklyn:

"The undersigned members of the Committee on Lamps and Gas do request that you cause to be made an analysis of what is known as water gas, manufactured by the Fulton Municipal Gas Company of Brooklyn, and of coal gas, manufactured by the Brooklyn Gas Light Company, and investigate to what extent the use of water gas is more dangerous to public health and life than is the use of coal gas. We also request that you cause to be compiled a list of all deaths caused by the inhalation of illuminating water gas in the city of Brooklyn and in the city of New York since its introduction in 1878; also, a list of all deaths caused by the inhalation of illuminating coal gas since its introduction in Brooklyn in 1849, and in New York since 1878, together with the proportion of each gas used in New York and Brooklyn within the above period; and in what States of the Union has the use of water gas, or any gas containing more than 10 per cent. of carbonic oxide, been prohibited by law, and report to this Committee at your earliest convenience. Yours respectfully,

GEORGE H. STERLING,
ROBT. HILL,
OWEN E. HOUGHTON,
PHILLIP CASEY,
Committee on Lamps and Gas."

In reply to the above communication Commissioner Raymond, on July 9, sent in a report of the results of his investigation. In this report he says he has had an analysis of the two gases made by Professor Ira Remsen, of Baltimore, giving their relative constituents as follows:

Specimen marked "A" (coal gas) was found to have the composition expressed in the subjoined table:

Carbon dioxide (carbonic acid)	0.00 per cent.
Illuminants (ethylene, etc.)	4.30 "
Carbon monoxide (carbonic oxide)	7.90 "
Hydrogen	50.20 "
Marsh gas	29.80 "
Nitrogen (by difference)	7.80 "
	100.00

The composition of specimen marked "B" (water gas) is here given:

Carbon dioxide (carbonic acid)	0.30 per cent.
Illuminants (ethylene, etc.)	12.85 "
Carbon monoxide (carbonic oxide)	28.25 "
Hydrogen	30.30 "
Marsh gas	21.45 "
Nitrogen (by difference)	6.85 "
	100.00

Then follows a statement giving the summary of deaths by gas inhalation in Brooklyn, New York, and other cities in this country, and also in European cities, as follows:

Cities.	WATER GAS.		COAL GAS.	
	Deaths.	Injury not Fatal.	Deaths.	Injury not Fatal.
Brooklyn	8	13	3	0
New York	44	(Verification not attempted)	21	(Verification not attempted)
Buffalo	0	0	1	0
Boston	0	0	3	0
Philadelphia	0	0	1	0
Other cities in U. S.	2	1	6	4
European cities	0	0	*31	9
	54	14	66	13

*Received too late for verification.

It will be seen in the tabulated form given above it is said "verification

not attempted;" and the figures marked with a star are reported as "received too late for verification."

After this follows the number of persons killed by inhaling gas in the city of Brooklyn, in accordance with the figures given above, showing that 3 persons have been killed by coal gas since its introduction in 1849, and that 8 persons have been killed by water gas from 1881 to the date of the report.

As the Commissioner is requested in the communication sent him to report what deaths have occurred in Brooklyn from illuminating coal gas since its introduction in that city in 1849, and also in New York since 1878, and also what deaths have occurred in New York and Brooklyn from the inhalation of water gas since its introduction in 1878, it would appear as if some of the figures—especially the foreign ones—were brought in more as a make-weight than for any other useful purpose.

We shall endeavor, however, to analyze the report given above, commencing with Brooklyn. In the report it is stated that there have been 3 deaths from coal gas since 1849; and this where all the gas manufactured and sold has been coal gas. In the period embraced from 1849 to 1881, or 33 years, the quantity of gas sold was about 22,000,000,000 cubic feet.

At the same time, there have been 8 deaths from water gas between 1881 and 1883, and the quantity of this gas sold was about 1,200,000,000 cubic feet, and has not averaged during this period over one-fourth of the total quantity of gas consumed.

To pursue this inquiry a little further, we find no record of a death from the inhalation of gas in the eastern section of the city, bounded by Clinton avenue, until the year 1883, although coal gas had been furnished since 1849–50, and the quantity sent out about 6,000,000,000 cubic feet. In 1883 the People's Gas Company began supplying water gas, and in less than two weeks thereafter an old lady was killed; another death soon followed from its effects, as is shown in the records given in the table.

In the city of New York the number of deaths from water gas is given as 45, and from coal gas 21, at the same time stating "verification not attempted," which is a good proviso, as we know it would be an impossible thing to verify that these deaths had been caused by *illuminating coal gas* since its introduction in 1823, or a period of 60 years.

Deaths are reported frequently as occurring from coal gas, and they are from coal gas; but it is the gas from a coal fire, which, from incomplete combustion of the fuel, produces the same deadly carbonic oxide so largely prevalent in all water gas.

In the city of Philadelphia there is reported one death from coal gas. The supplying of that city with illuminating gas commenced in 1834, or 49 years since; and all of the gas there manufactured has been made from coal, excepting in a small suburb, where water gas has been manufactured for a short time. Gas is more extensively used in that city than in any other we know of, almost every house having its gas supply. The poorer, and supposed ignorant, classes use it to a very great extent; and if accidents are liable to occur, these would be the persons most likely to have them.

With all this, what do we find. There is reported one death, in nearly fifty years, from coal gas; and it is only reported as a death from coal gas. Perhaps the following may explain how that death occured.

"Isaac Batten was found dead in a room at the City Hotel this morning, *having committed suicide*. He came to the hotel on December 6, saying he was from the West. About 11:30 this morning the odor of gas was noticed in the hall and the door of the room was broken open. Batten was found lying on the floor, with his clothes on, and his head resting on a chair. He had stopped all crevices in the window and transom with strips of a handkerchief, placed his coat at the bottom of the door, turned the gas on and closed off the draught in the stove by pulling it from the wall and stopping the pipe up. He left a letter saying that he had suffered for five years with his throat, and had no desire to live longer."—Philadelphia paper December 27.

The only conceded element in illuminating gas that is poisonous is the carbonic oxide; and, although it may be called carbon monoxide, oxide of carbon, or protoxide of carbon, it is the same deadly element, and its killing qualities remain.

It is composed as follows: One atom of carbon uniting with one atom of oxygen, or, by weight, 6 ounces of carbon uniting with 8 ounces of oxygen, thus forming carbonic oxide, the symbol of which is CO, and equivalent, 14; while in carbonic acid one atom of carbon unites with two atoms of oxygen, or, by weight, 6 ounces of carbon uniting with 16 ounces of oxygen, forms carbonic acid, the symbol of which is CO_2, and equivalent, 22. In the above, the word ounce is used to more properly define the quantity of each constituent. The composition is made with lesser or greater quantities, using the same proportions. It will be seen that the carbonic oxide has only one-half the oxygen that the carbonic acid contains, and, in inhaling it, the blood is robbed of its oxygen, and death soon follows.

We have had handed to us a list of deaths and cases of suffocation from water gas. In the cases reported as suffocations, a number no doubt die, or, they do not, are permanently disabled from the absorption of the poison into the system.

From this list we find that there have been the following deaths and suffocations:

	Deaths.	Suffocations.
New York City	51	36
Brooklyn	8	13
	56	49

Showing 51 deaths and 36 cases of suffocation in this city, from a quantity less than one-third of the gas distributed during the period covered.

The manufacture of water gas would not be tolerated in any other country than our own. Why it is permitted to be made in this country, the people are competent to decide without a statement from us. Its manufacture has been prohibited in Europe, and the late lamented E. Stern, who brought the abandoned process of manufacture from France to this country, becoming alarmed at the great number of deaths, employed competent engineers to experiment in order to get rid of the poisonous element carbonic oxide. They reported to him that it could be done, and he immediately commenced forming a company to manufacture gas that would contain not over 8 or 10 per cent. of carbonic oxide, when death removed him from his sphere of usefulness.

The Petroleum Outlook.

The general condition of the oil producing trade remains unchanged since our last report, but, at the same time, elements are at work which promise to bring about a state of affairs favoring the producer and holder of oil, rather than the purchaser and consumer.

Prominent among these is the extremely large runs during the month of June, averaging 70,000 barrels per day. These runs are so manifestly in excess of production as to invest the estimates of stocks at wells with special interest, as well as to tend to hasten the time when well stocks shall virtually cease to exist.

It is claimed that during June, these stocks were decreased 181,937 barrels. Making every deduction reasonable, it is safe to put this amount at 114,937 barrels for the Bradford and Allegheny fields. Recent changes in the method of storing oil at the wells render this reduction more comprehensible. Formerly, in the districts above named, from two to six 250-barrel tanks were located at each well. Now the rule is to place such tanks at a lower level and only a 15-barrel tank directly at the well. The pipe lines have drained these lower tanks and the upper and smaller receptacle represents the well's stock.

We find no reason to modify our prediction that the month of August will witness a decline in all producing fields which neither the liberal use of the torpedo nor the opening of new territory can counteract. It seems only reasonable to assume that before that time the runs will represent a larger amount of oil than the wells of all the fields are producing, and hence, stocks must be drawn upon. Indeed, since the beginning of the present month (July) the stocks in tank show a falling off as compared to a similar period in June.

Prices show an encouraging advance, the average for June being $1.16⅛, a higher rate than any month since December 1879, and for any June since 1877.

New production, an element possessing the most delusive attributes, shows a marked decline as compared to May (657 barrels per day). It is delusive by reason of the ephemeral yield of nearly all the wells opened in the Forest County fields. The first hour or first day's yield of a new well has invariably proved the best, and the most rapid decline followed the most promising start.

Refined has ruled lower; in fact has been held at such figures as to discourage refiners and eliminate all profit in the trade.

New territory as yet has not appeared to disturb the producer. Considerable interest has been aroused regarding the region near Macksburg, Ohio, in Noble and Washington counties. Considering, however, the depth of the producing rock, the presence of salt water at great depths and the small yield of wells already completed, it seems safe to state that, at present prices, oil cannot be produced with profit in the Macksburg fields.—*Stowell's Petroleum Reporter.*

Growing Competition of the Gas Engine.

The *Scientific Press* says that English shops engaged in the manufacture of the lighter class of steam engines are receiving very few orders for such work. It is also stated that this new falling off in such orders is mainly due to the increasing demand for improved gas engines of small capacity, the manufacture of which is rapidly increasing. The gas engine in England, at any rate, is gradually, but surely, taking the place of the steam engine, where only a small driving power is required.

[Official Report.—Continued from page 33.]

Sixth Annual Meeting of the Western Gas Association.

Held at the Burnet House, Cincinnati, Ohio, May 9, 10, and 11, 1883.

Third Day—Morning Session—May 11.

Mr. S. H. Douglas, of Ann Arbor, Mich., read the following paper on

the purification of gas by the use of the oxide of iron.

A little experience that I have had at the Ann Arbor gas works may not be uninteresting to the Association, although, in some respects, the results are not especially new.

For many years after the erection of the works the ordinary purification, with lime, was adopted. The evils connected with this process—such as the labor of cleaning the screens, and the accumulation of foul waste lime, etc.—it is unnecessary for me to call to your attention; it is enough to say that they were of a sufficiently serious nature to lead me to a series of experiments.

I first tried iron turnings and sawdust. The result was not satisfactory. I then oxidized the iron, by long exposure to the air, and occasional moistening with a solution of the sulphate of iron. The use of this was still unsatisfactory, though better than the previous experiment. I then sought for a substitute. In the immediate vicinity of the city there are a great number of springs charged with the proto-salts of iron. The water flowing from these springs through the ravines and low grounds being exposed to the air, the soluble proto-salts of iron are converted into insoluble sesqui-salts, which are deposited more or less mixed with lime salts, clay, and sand. This deposit contains from 15 to 20 per cent. of iron.

One of these springs was found in the center of a level meadow; the spring bubbled up from below, depositing its iron until a mound had been formed, say 6 feet high and 20 or 30 feet in diameter. On digging into this mound I found it to be made up of the material above described. I took some of the material to the gas works, and charged the purifiers with it, unmixed with anything. It effected complete purification of the gas, all sulphur compounds being removed, as well as carbonic acid.

The chemistry of this purification depends undoubtedly upon the formation of a proto-sulphide of iron; this, on being exposed to the air, is oxidized to a sesqui-sulphate. This exposure is attended with considerable heat, and if the mixture is shoveled over once or twice, after three or four days it is fit for use again. This re-use can be continued until the material becomes so charged with tar as to prevent a proper contact of the gas with the iron. Practically, I have found that about one-twentieth part of the iron in use has to be thrown away with each change of purifiers. I have also found that one bushel of the iron oxide is sufficient to purify 225,000 cubic feet of gas, made from Yonghiogheny coal. I use it in 8 by 10 purifiers, with five screens. It lies upon the screen loose and free, and offers little obstruction to the easy passage of the gas, and, when removed from the screens, there is little or no adhesion. The gas contains but a trace of carbonic acid, and this trace is not perceptibly decreased by the introduction of lime trays. The illuminating power of the gas is not less than an average of 20 candles.

It will be seen that the cost of purification to the Ann Arbor works is merely nominal, as we have to pay only 50 cents per wagon load delivered. I am led to believe, from personal observation, that this material could be found in very many localities in this State, and that large quantities of it are to be had in the Lake Superior country at the cost of mere loading upon cars.

I may further say that the alumina or clay in the material is in such abundance that the ammonia is completely separated, and the carbonic acid as well; so that I have complete purification from a single material.

I have often been asked where this material can be found. It can be found in great abundance in many sections of our State. In the vicinity of Union City tons of it can be had for the mere expense of loading it upon the cars. I intended to have brought a sample of the material with me for exhibition, but forgot to do so. It is in the form of a powder; you may crush it in your hand. Instead of being in a granular state, like the iron sponge, it is in the form of a fine powder, with 15 or 20 per cent. of iron. Pounding it with a shovel reduces it to the condition of powder. I moisten it slightly, as it is placed upon the trays, by merely sprinkling it with a sprinkling pot. I do not moisten it enough to make it adhesive, but merely to prevent its running through the trays.

Discussion.

Mr. McMillin (Ironton, Ohio,)—What proportion of lime is there in it?

Mr. Douglas—There is very little lime—only that which comes from the hard water of the country. There is undoubtedly a little lime deposited with it; but it is a very small proportion. It is not caustic lime. I do not know that the hard water, or the lime contained in it, plays any important part in the process of purification. The alumina and the oxide of iron are the essential constituents of the material. I think the alumina or clay is better than the iron sponge, because of the presence in it of the materials which separate the ammonia and carbonic acid.

Mr. McMillin—You think there is nothing at all in the mixture which has any purifying property except the alumina and iron?

Mr. Douglas—The alumina and sand are the materials which possess the purifying properties.

Mr. McMillin—It seems to me that the sulphur is large for the percentage of iron which is found. Probably of the protoxide of iron there would be from 12 to 14 per cent. That takes the sulphur out, and purifies 225,000 feet of gas.

Mr. Douglas—The figures which I gave were determined by actual trial; they are not guess-work. I have made repeated experiments as to the amount which can be purified.

Mr. J. M. Starr (Richmond, Ind.)—Do you mean that one bushel will purify 225,000 feet of gas at one time?

Mr. Douglas—No; but I can use a bushel of the oxide of iron long enough to purify that quantity. It does it by repeated use. I could use it longer than I do were it not for the fact that there is more or less tar carried over into our purifiers; and when the oxide of iron in the lower screen becomes charged with tar I have to throw it away.

Mr. T. A. Cosgrove (Evanston, Ind.)—How often do you change the purifiers?

Mr. Douglas—Our works are small—making from 25,000 to 35,000 feet per day. I charge the screens, putting in new material, about once a month.

Mr. Harthan (Selma, Ala.)—What is the size of your purifiers?

Mr. Douglas—They are 8 by 10.

Mr. Thos. Butterworth (Rockford, Ill.)—Do you revivify this?

Mr. Douglas—Very likely I could renew it by burning the tar out; but the material is so cheap that I have never tried to do it; I simply throw it away.

Mr. Butterworth—You take 225,000 feet from a bushel, and then throw the material away?

Mr. Douglas—Yes.

Mr. Butterworth—You get the raw material so cheaply that you do not think it is worth while to revivify it?

Mr. Douglas—That is the reason I do not do it.

Mr. Butterworth—You could run it six weeks if you took the tar out.

Mr. Douglas—Very likely I might do so. I continue to run the gas through till the first purifier is charged with tar.

Mr. Butterworth—I have been using this material, and have not bought a bushel of lime in ten years.

Mr. Starr—I do not believe that I understand the Professor yet. He says that it purifies 225,000 feet per bushel; but his own statement shows that he changes it once a month; and if he makes 25,000 feet per day, and runs it a month, he would purify 750,000 feet in a month. Then he takes out his purifying material and revives it, and puts it back again. He has, perhaps, in that purifying box, 10 by 12, not less than 100 bushels of material.

Mr. Douglas—I put in five bushels per screen, and have five screens.

Mr. Starr—Then that is 25 bushels of material, which purifies 750,000 feet in a month. That is 30,000 feet per bushel of material. You run that for several months, in order to get the 225,000 feet per bushel. Do you take it out and revivify it, and put it back again?

Mr. Douglas—I calculate to throw away, with each change of purifiers, one-fifth of the material, and I have the other to revive and use over again. My computation is that a bushel of material purifies 225,000 feet of gas before it is thrown away.

Mr. J. H. Woodmansee (Danville, Ill.)—Do you use it without intermixing with anything else?

Mr. Douglas—I mix it with nothing. I use it just as it is dug from the earth.

Mr. Smith—Have you ever tried sawdust in the bottom of the purifier.

Mr. Douglas—I have never used sawdust mixed with this material. I have had no occasion to use it, and do not know of any advantage that would result from so doing.

Mr. Smith—Since 1876, I have been using the oxide of iron process, and have been very successful with it. I have saved quite a sum of money each year right along, by its use. I have no traces of sulphuretted hydrogen; and no traces of carbonic acid remain in the gas. I have used sawdust, iron borings, and lime. The purifiers are 7 by 10; we have four of them, and we use three at a time. I commenced using it in 1876, and have been very well satisfied with the result. We used to burn up a sieve every year with the lime; but I have not bought a new sieve since 1876.

Mr. Douglas—I have just received a note from some person in the room saying that there is a spring in the State of Maryland, near a railroad, of the same description; and I have no doubt that this material can be found all over the country.

Mr. J. R. Smedberg (Lancaster, Pa.)—During the visit to the Cincinnati gas works yesterday, I do not know whether many of you paid attention to the pile of oxide which had just come out of the boxes at that station. If you did you must have seen that there was, to say the least of it, *a little* tar mixed with the oxide. Now, although this station is a patchwork, it is the most wonderful mosaic piece of engineering in the country. Remembering it as it was thirty years ago, and comparing it as it then was with what it is now, while one or two of the features still crop out, the change, to me, has been miraculous—that they should have been able to keep on making gas while making such extensions to it. With that tribute, which is thoroughly sincere, to the general construction of the works, I want to point out that this superb station passes its tar into its boxes. In this case I am speaking of the oxide. In conversation yesterday with Mr. Fullager I said, "Of course, you have tar passing into your boxes?" He said it showed for itself. I said, "Supposing no tar gets into your boxes; what is the result?" He replied, "In the case of lime, the purifying power of the bushel will be increased by from 500 to 1,000 cubic feet." I said, "Do you think that, in regard to the use of the oxide, the lifetime of the material should be doubled?" He said, "Unquestionably." I understood you correctly, did I not?

Mr. J. Fullager (Cincinnati, Ohio)—Not quite doubled.

Mr. Smedberg—Now, I think that Mr. Fullager, Mr. Lansden, and Mr. Butterworth will all join me in saying the same thing. I have but one further thing to say. I wish to mention the name of the Pelouze condenser but once, for I do not come here as a drummer. Granted that this result can be prevented—what will it do? Mr. Littleton has been using one of these things for five years. In those five years not one teaspoonful of tar has got into the boxes. Mr. Somerville has been using one for five years; he authorizes me to say that he has substantially the same result. Mr. Decker, of Hannibal, has been using one for two years with the same result. Mr. Butterworth has been recently erecting one, and although it is early in the day, I ask for his testimony. I have said all that I wish to say. You can draw the conclusions for yourselves.

Mr. Lansden (St. Louis, Mo.)—While we are on this subject, there is one question that I would like to present. Within the last year there has been an accusation brought against iron purification. It has been said that gas purified by the oxide of iron has a very deleterious effect upon meters. To me it is an entirely new question. I ask for the experience of those who are using the oxide of iron—whether or not it is a fact that gas purified by the oxide of iron affects the meter. There is another thing which I would like to ask Professor Douglas; whether or not, in his opinion, there is anything in the purifying material which he uses, that extracts the carbonic acid over and above what the ordinary oxide of iron would extract. As I understood, from the paper, he has less carbonic acid in his gas while using the present material than he had when using the ordinary oxide of iron. Was it because the iron was in a different shape, or was there something in the constituents of the iron oxide which assisted in reducing the quantity of carbonic acid in the gas?

Mr. Douglas—I can only state the fact with reference to the carbonic acid. I was fearful that the iron was not extracting all the carbonic acid, and I tested the gas very carefully for carbonic acid. I charged one tray with lime to see whether it extracted any more carbonic acid. I could get only a trace of carbonic acid in using the iron. I could not see that it perceptibly decreased the amount of carbonic acid when using lime in connection with the iron. On the other point, as to the injuries to the meters, my experience has been this—we have been using the oxide of iron for between seven and eight years, and I have perceived no injurious effects upon meters. I do not think that it is in any way damaging to them. I would say, however, that, in using the iron sponge, which is a different article, there may be danger of injury to the meter for the reason that I cannot say that the iron sponge would extract all the ammonia. A little ammonia might be carried on with the gas. In the case of the native oxide of iron mixed with alumina, all the ammonia is extracted. It is extracted on the principle which every scientific agriculturist recognizes as correct—by the absorbent power of alumina or clay for ammonia in a fixed condition. The alumina or clay in this mixture does precisely what it does for the agriculturist; it holds the ammonia till it is again exposed to the air, when the ammonia, or a large portion of it, makes its escape. But the ammonia is held there and stopped in purifying, instead of being allowed to pass on. If iron alone were used, this would not probably be the result, for then the ammonia would pass on with the gas. I am inclined to think that it is the effect of the more complete extraction of the ammonia by the native iron process, than is done by the iron sponge. In examining the material at the Cincinnati Works yesterday, I observed that the iron sponge was in a granular form. The native oxide of iron is in a very different condition. You may take it between your fingers and reduce it to an impalpable power. There is nothing granular about it. There are no coarse grains in it.

Mr. Lansden—Providing we extract the ammonia before it gets to the purifier, do you believe that there is anything in the purification for sulphur only, where we take the ammonia out by water or by scrubbing, that would affect meters?

Mr. Douglas—I do not. Let me say, with reference to the ammonia, that we all know that an excessive washing of gas detracts from its illuminating power. I do not wash my gas at all. I pass no water into the washer, or very seldom do it. It goes into the condenser and through a nominal washer; but I allow scarcely any water to be brought in contract with the gas. That is one reason why the illuminating power of the gas is greater than is usually obtained. The purifiers extract the ammonia without the use of water.

Mr. Fullager—I have been using iron sponge for over two years. I started with a great deal of prejudice against it. When I first introduced it into the works I found that the carbonic acid was not all taken out. I then put in a layer of 15 inches of the oxide, and 3 inches of lime, and found that we had a great deal of moisture and tar coming from the purifying house. The scrubbers were not large enough. I then placed a layer of lime at the bottom of the purifiers to take out the moisture and the tar. The oxide which you saw there yesterday has purified 100,000 feet per bushel, and I expect to carry it on till the first of September. I found the last lot that I used was so filled with moisture and tar coming over that I had to throw it away in about four months. It caked, and so we could not use it; but since we have put in the bottom tier of lime we have had no trouble. As to the meters, I find no difference. We take the ammonia out before it reaches the oxide. The oxide has been used for thirty years in Europe, and we hear nothing there about meters being spoiled.

Mr. Butterworth—Is it, according to your experience, if the oxide is put in and kept free from the tar, that after it has been used a certain time it does more work afterwards than it did at the start?

Mr. Fullager—It will do about one-third more work if you can keep the moisture and tar from it, because you have to throw away what lies on the bottom of the tray when it takes up the tar.

Mr. Butterworth—Is it not the alumina that fills up, and is it not the body of the alumina that helps the thing along?

Mr. Fullager—That helps to take it up. If he finds ammonia there, he wants it; we do not want it, because we do not allow the ammonia to get there. The tar increases the pressure from 5 inches to 14 inches, after being in use for six days in the purifier. I have had to change the purifiers on account of the pressure. At this season of the year I have men in the purifying house but two days in the week; when I was using lime alone, I kept four men in the purifying house carting the lime out. That shows the difference in the expense. When we used lime, it took twelve men and two carts to keep it going; now we are using six men and no carts. That is the difference in the labor required. I am not speaking of any particular kind of oxide, for I believe that any description will answer the same purpose so long as you keep the pressure down.

Mr. Smith—I have the same meters in use now that I had when I began to employ the oxide in 1876. I have examined these meters very carefully to see if there was anything about them which was being destroyed; but I could find nothing. I find that they are the same after using the oxide for seven years. We have some meters which we have been using since 1857; I find, on examining them, that they are all just as good as the others. I think, if the ammonia should get to them, it might harm them; but I wash out the ammonia very carefully. If there is any trace of ammonia at the third purifier we wash it a little more. You never find carbonic acid where you find ammonia. At first I had some dread of using the oxide of iron on account of the carbonic acid. We use sawdust in one of our purifiers, and then burn it or throw it aside; consequently we can take out the other stuff and revivify it, and thus use it for years. We use a thin layer of oxide of iron, and have two or three inches of lime on top of the oxide.

Mr. Fullager—Some of you may have noticed yesterday that we are changing our purifiers, and are going to use a catch purifier, to do away with the tier of lime in the purifiers. It is a very expensive work for us to put in a tier of lime; but by the alterations we are now making we can use the purifier for two or three weeks without changing.

Mr. Smedberg—Mr. Douglas is, of course, familiar with the sequence of purification in the Beckton Works. It is the practice there to use, in the first place, a set of boxes charged with lime, and then pass the gas to the oxide. The theory of that is this—when the sulphides of lime are exposed to the foul gas, its carbonic acid will displace the sulphuretted hydrogen and form a carbonate, leaving the oxide free to do its proper and only possible work on the sulphuretted hydrogen itself. Mr. Fullager's existing practice is to use the foul lime first. The foul lime does more work than he claims for it. It does take out the tar and water, but it takes out the carbonic acid beside. If, as he now intends doing, he puts in a terminal box charged with fresh lime, it will be an entire reversal of his present method; and I want to know why he changes the sequence of that box.

Mr. Fullager—The lime that we have in the top purifier is charged with carbonic acid gas. There is very little sulphur in it. The sulphur is taken

up by the oxide. It contains just what passes the first and second boxes. In this catch purifier we expect to use lime, and to place that in the bottom of the box in the other purifiers, not reversing the process, but keeping the same process up. It is to save trouble arising from that tier of lime mixing with the oxide. In cleaning the trays the men are apt to take a shovelful of the oxide and mix it with the other.

Mr. Lansden—As we all find various circumstances surrounding our works, I will give my experience. I see that Mr. Fullager uses his lime on top of his oxide, first placing it in a tray below to catch the tarry vapors. The way I use the lime is this—I use it on the lower tray, 3 inches thick, to take out the carbonic acid and all the tarry particles. It thus keeps the oxide entirely clean ; but, of course, there is a certain loss every time it drops through. That we expect. I thus have only two materials to handle and fill the purifiers with. I purify not quite one-half my gas with the oxide of iron. I have two sets of purifiers and two station meters. They are separate. In the year 1882 I ran about 190,000,000 feet through the oxide of iron, and I ran 230,000,000 feet through the lime purification. Of course, after passing the meters, the gas passes together into the holders. I find no more carbonic acid in my gas now than when I was purifying entirely with lime. As this iron process is comparatively new in this country, we need, if possible, to have this question of injury to meters thoroughly investigated. I think it is the ammonia that does the injury (if such be done) instead of anything which is contained in the iron. I think a great many works through the country have, during the last few years, been driven beyond their capacity for taking the ammonia out. As Professor Douglas says, whenever the ammonia passes over it will affect the diaphragm of the meters. I think this is where the blame lies with those works which have complained ; it is the purification that has caused the trouble.

Mr. Smith—What was the comparative cost of the two methods of purification?

Mr. Lansden—With lime we purified about 19,000 feet to the bushel.

Mr. Smith—Can you give it in dollars and cents?

Mr. Lansden—Some pay one price for lime and some pay another. My purification was changed, by the use of the oxide, from 19,000 feet to 35,000 feet per bushel. There are a great many men interested in the different processes of purification by the oxide of iron. I have used two kinds. I have, the last year, been making my own oxide of iron. I have no iron ore or spring to get the iron from ; but I have some large machine shops which sell their borings for 50 cents per hundred ; I get sawdust for a reasonable price ; I have plenty of water, and that is the way I now make my oxide of iron.

Mr. McMillin—I think that we ought not to lose sight of the fact that Dr. Douglas has succeeded in reducing his carbonic acid to a minimum without the use of lime. I would like to know whether he has any idea how the thing is done. How is the carbonic acid extracted? What does it combine with? Since hearing his paper, and the statements which have since been made, it occurs to me that perhaps the arresting of the ammonia in the alumina permits the carbonate of ammonia to be formed there. What do you think of it, Mr. Douglas?

Mr. Douglas—I am under the impression that there is no chemical change taking place by which the carbonic acid is taken up. I think that the carbonic acid is absorbed by the porous material of the the alumina and oxide of iron, mechanically. All chemists well know that all porous materials have the power of absorbing large quantities of gas, and holding such in a fixed condition. You have all seen the self-lighting apparatus, in which a platinum sponge is used. For example, place a piece of platinum sponge in front of a gas light ; it is already strongly charged with atmospheric air, but also absorbs the gas immediately in such quantities as to bring the oxygen of the atmospheric air and the gas itself into contact with such a degree of heat as to ignite it. The gases are forced together as they would be forced together by sudden pressure, as from a pump. You can ignite gases thus by simply pressing them together. I take it that this absorption of the carbonic acid is of precisely the same nature. I think the carbonic acid is absorbed by this porous material to be again emitted on being exposed to the air. It is a mechanical absorption, and not a chemical combination.

Mr. McMillin—Could that be the case with the gas passing through it all the time? I hardly see how it can be mechanically suspended, with that product going through it.

Mr. Douglas—It is of precisely the same nature as the platinum sponge. Every material of that spongy nature has the capacity for absorbing gases in large quantity. Platinum sponge, for instance, will absorb ninety times its own volume of any gas, and will hold it for a certain length of time. The material which I use is of precisely the same character. It is an open, porous material, and it absorbs these gases in large quantities and holds them there. In reply to a remark of Mr. Smith, that he uses the purifiers in a single layer, or in two layers, and piles it up very thick, I will say that I have tried that with the material which I use, but it does not work well. It will settle down so compactly as to afford so much obstruction to the passage of the gas that it is not profitable to use it in that way.

Mr. Starr—I think Mr. Douglas paper gives the reason why his carbonic acid is absorbed. He states that there was lime deposited from this spring, the water being hard. If there was a portion of lime deposited in that substance, it would take up the carbonic acid.

Mr. Douglas—It is already a carbonate of lime.

Mr. Starr—That satisfied my mind of the reason. Now, with regard to the destruction of the meters—did not Mr. McMillin use, a great many years ago, an iron dust?

Mr. McMillin—Yes.

Mr. Starr—Seventeen years ago I commenced using this iron dust. I used it for twelve or sixteen years. Then I used the iron sponge. I do not know that my loss of meters is greater than it is in other places. Mr. Lansden has said that he expected to lose the iron sponge that dropped through the riddles on to the lime. I cannot see any very good reason why he would have to do that ; he should take some way to avoid it. When I first started my purifiers, I thought I lost ten or fifteen bushels with every purifier. To prevent this I used gunny cloth, and, after putting in the course of lime, I covered it with the cloth, then put on a coarse tray and covered it with the iron sponge. I do not think that I now average a loss of more than a bushel of sponge to a purifier. I save it all.

Mr. Lansden—That loss with me amounts to nothing. There is something about this iron process, which makes it swell. I made a box containing about 500 bushels, and have used it from six to fifteen months. I have never added to that. Whatever loss there was has been made up by the swelling of the material. Each box is put out separately in the sheds, and I use the material over and over until it becomes so impregnated that it will not do its work. I have not had to add to any of the boxes since I started. The loss is very small if the men are careful. When the men take the trays off, on which the iron sponge is placed, I tell them to save all that they can. I have never yet found the loss sufficient to compel me to add to any of the boxes. It may be that, when I get through the boxes, the material is an inch deeper. At first it was 16 to 18 inches deep, except in the winter time, when making an excessive amount of gas, that put it down to 14 inches. When we do that we change the purifiers often, as it gives less back pressure. I use trays having a quarter of an inch open spaces.

Mr. Douglas—I will mention one experiment which I made in connection with iron purification. I said that I suffered a loss of my material, which became so charged with tar as to lose its efficiency as a purifier. As a matter of experiment, I took some of this material, which is usually thrown away, and put it into the retort in order to see what would be the effect of burning the tar out. I allowed it to remain there till it was heated to a red heat. I then again tried the material as a purifier; and it was a failure. It was good for nothing after it had been ignited, and burned in this way. I am not entirely satified of the reason why it was so.

Mr. McMillin—Did it not remain black after you had heated it, as though it were magnetic oxide?

Mr. Douglas—Yes ; it was probably converted by the heat into a magnetic oxide, or perhaps into a sesqui-sulphide. I did not analyze the material; but there was evidently some chemical change effected by this high heating. I think the photo-sulphide, which is ordinarily there, was changed into a sesqui-sulphide or magnetic oxide.

Mr. Smith—I see that, in parts of Scotland, they use all this waste material for making sulphuric acid. Do you not think it could be made to pay here, by sending the waste from the different works to some central point and there making sulphuric acid?

Mr. Douglas—I doubt if it could be made to pay to manufacture the sesqui-sulphide into sulphuric acid.

Mr. Gimper—Mr. Douglas speaks of this finely divided material absorbing ammonia and carbonic acid. I have always understood that ammonia is an alkali, and that carbonic acid is an acid. The two cannot exist separately. The affinity between the two will make them combine and form the carbonate of ammonia. Either we have an excess of ammonia, or we have an excess of carbonic acid. Whichever one is in excess will be carried forward. There is no doubt that the material can then absorb the carbonic acid; or, if the material is in excess, it can absorb the ammonia. But I do not think it possible that the two can exist separately in the same vessel, or pass through the same pipe.

Mr. Douglas—Undoubtedly the ammonia is largely in excess in the case of gas purification. It is well known that the affinity between carbonic acid and ammonia is very feeble. Carbonic acid is a feeble acid. It is true that it will unite with ammonia to form the carbonate of ammonia; but, at the same time, it holds the ammonia with a very feeble affinity. This is illustrated in the ordinary smelling salts where the ammonia is thrown off, not as a carbonate, but in the form of free ammonia.

Mr. Gimper—In what form would it be if absorbed as ammonia?

Mr. Douglas—It would exist both as a carbonate and as free ammonia. That it is free ammonia is shown by the fact that when you remove the lid

of the purifier the ammonia odor is intensely strong—much stronger than in the case of lime purification.

Mr. McMillin—I have often thought that the carbonate of ammonia was formed. I have made experiments similar to those of Mr. Douglas, in trying to revivify the oxide by heating. If put into the retort where there is not an excess of oxygen, it makes a black, metallic-looking substance, which I have supposed was magnetic oxide. When burned outside, where there was an excess of atmospheric air, it will oxidize very nicely. By spreading it on shelves, and starting the fire up, if the fire is kept up long enough, it will oxidize, and become just as red as any of the other sesqui-oxides. But in the retort, where there is an insufficient supply of oxygen, it has seemed to me to form magnetic oxide.

On motion of Mr. Cosgrove the thanks of the Association were tendered to Messrs. Smith and Douglas for the interesting papers read by them.

MISCELLANEOUS BUSINESS.

On motion of Mr. E. J. King, seconded by Mr. J. Fullager, the salary of the Secretary for the ensuing year was fixed at $150.

On motion of Mr. Smedberg, seconded by Mr. Lansden, the Secretary was instructed to prepare a suitable badge of membership.

Mr. G. Burns stated that on the evening of May 10, he met a gentleman, named Samuel Williamson, of Cincinnati, Ohio, who wished to purchase carbon from gas companies. He would pay $8 per ton; and would take any quantity of it that would be offered.

THANKS TO THE HOSTS.

Mr. Smedberg—I move that the thanks of the Convention be returned to the Cincinnati Gas Company, and to the manufacturers of Cincinnati, and of the West, for the noble-hearted way in which they have entertained us.

Mr. E. L. Brown (Chicago, Ill.)—I second that motion most heartily.

Mr. L. K. Schofield (Fort Scott, Kan.)—I move, as an amendment, that a committee of five be appointed by the Chair to draft resolutions expressive of the sentiments of the Convention towards those who have been so courteous to us.

The amendment was agreed to, and the resolution, as amended, was adopted. The President appointed, as such committee, Messrs. L. K. Schofield, E. L. Brown, J. R. Smedberg, G. A. Hyde and J. M. Starr.

A recess was then taken until 2 o'clock P. M.

AFTERNOON SESSION—MAY 11.

The President—The first thing under the head of business will be the reading of the report of the committee appointed to examine the books of the Secretary and Treasurer.

Mr. E. J. King (Jacksonville, Ill.) presented the following report:

To the Western Gas Association:—

Your Committee appointed to examine the books of the Secretary and Treasurer would respectfully report that we find as follows:

Receipts.

Cash on hand, May, 1882	$61 22
Initiation fees	80 00
Annual dues	261 00
	$402 22

Disbursements.

Paid out as per vouchers	$47 40	
Salary of Secretary and Treasurer	75 00	
Stenographer's report	70 00	
Balance on hand	209 82	
		$402 22

We would also report that we find on the books the names of parties who have neither attended our meetings nor paid their annual dues; and we therefore recommend that the Secretary and Treasurer be authorized to send a notice to each delinquent, embodying the substance of this report pertaining to the arrears of members of this Association, and in case of non-payment by said delinquent members within a reasonable time after such notice, that such delinquent be dropped from our list of membership.

Your Committee, who have had occasion to notice the efficiency of the services rendered by your worthy Secretary and Treasurer, take great pleasure in emphasizing our hearty approval of the same.

E. J. KING,
T. A. COSGROVE,
GEO. B. BURNS,
Committee.

On motion, the report was received and placed on file, and the recommendations adopted.

WEIGHTS AND MEASURES.

Mr. E. J. King—As chairman of the Committee on Weights and Measures, I would report that we were unable to find the figures needed until this morning, and are not yet prepared to make the report. I ask that the Committee be authorized to confer together, and send to the Secretary the result of their comparisons, and then let the Secretary issue the card, which has been proposed, to the members of the Association. Or, if that is not thought best, I ask that the Committee be continued till next year.

The President—There being no objection, the request of the Committee will be granted.

STATE ORGANIZATION.

The President—The next thing in order is the report of the Committee on State Organization.

Mr. E. J. King (Jacksonville, Ill.)—As chairman of that Committee, I will state that it was understood we were appointed to report next year; but after conferring with members it was deemed by us best to present our report at this time; and if the members are now ready to hear it, I ask the privilege of reporting.

The President—There being no objection, the Committee will present the report at this time.

Mr. King then read the following report:

WHEREAS, Unscrupulous parties, backed by increased capital, have recently subjected the interests we represent to a new form of the old raiding process; and

WHEREAS, While these raids are represented to be in the interest of consumers and cheaper rates, they are well known to be but schemes for enriching the projectors at the expense of vested interests, and, where successful, have in every case ultimately increased rather than diminished prices, and, by causing the unnecessary investment of additional capital, have made further and continuous equitable reduction impossible; and

WHEREAS, We fully recognize that the interests of the producer and consumer are identical, and are equally entitled to protection; therefore be it

Resolved, That this Asssciation favor immediate action, and recommend organization for mutual assistance and protection against all blackmailing schemes and raiding processes, and that the members of this Association at once present to their respective executive officials an urgent appeal to communicate with the President of this Association (Mr. J. B. Howard, Dubuque, Iowa), in order that early and definite action may be taken, and that the Secretary be authorized and directed to transmit a copy of these resolutions and Mr. Ramsdell's paper to our various companies.

(Signed) R. SPENCER,
E. J. King,
GEO. G. RAMSDELL,
Committee.

The President—You have heard the report of the Committee; what is your pleasure with regard to it?

Mr. H. Harthan (Selma, Ala.)—I move the adoption of the report as read.

Mr. J. Somerville (Indianapolis, Ind.)—This is a very important subject. While, in some respects, I agree with the Committee, it seems to me that the report which has been presented is rather crude, and contains some phrases which seem to me to be objectionable. I think the question had better be postponed.

Mr. J. M. Starr (Richmond, Ind.)—I do not want to bother the Association with my views on the matter; but I wish to say that the paper has not at all taken the course which I hoped would be taken by the Committee. Our Secretary can present that to the different companies in a circular letter, but there is no proposition contained in the report for the companies to act upon. There is no proposition asking the companies to do so and so. There is no request for co-operation. I think that the proposition should come in under a different head, such as an insurance company. Let the Committee propose that the companies shall agree to stand good for one cent or one-quarter of a cent per 1,000 feet of their make. Let them appoint a responsible party to have the matter in charge, and look after the interests which they think are imperilled.

The President—I think, perhaps there is a misapprehension of what was desired by the members who proposed the action of the Association on this subject. The views of Mr. Starr with regard to a mutual insurance organization are hardly applicable. He will bear in mind that the different States have different numbers of gas companies. It is hardly possible that such an institution as he proposes can be organized and carried on successfully. The report of the Committee is intended to be simply preliminary. It gives the gas companies of each State an opportunity to do something which shall benefit themselves. After the circular proposed shall have been sent to the gas companies of each State, I think that the several gas companies in the different States will take action upon the subject independently; and it seems to me that the only proper way in which the object desired can be accomplished is through State organization. When State organizations are perfected, representatives might be sent from each to a general association which shall have power to take what further action is necessary. This report is preliminary. The Committee were not instructed to report at this time, but they have, in response to the wish of some of the members, made certain suggestions for your consideration.

Mr. J. Somerville (Indianapolis, Ind.)—If it were not so soon after dinner I might possibly say something pertinent to this subject. It is a question of very great importance to the Association. I feel a great interest in it, but wish it had been bought up earlier in the morning. We cannot fully discuss it now.

Mr. Thomas Butterworth (Rockford, Ill.)—I do not think this talk has anything to do with the question. It is a theory of ours that there can be no taxation without representation. I think, therefore, the matter should be kept entirely with the directors and presidents of the several companies. Our Committee can call their attention to the subject, and then let each company do its own business in the way of forming State organizations. Those who pay the taxes can then have the benefits which may result from such organizations. I think that the subject, and the discussion, is outside of the proper work of this Association. I wish to stop the discussion, and with that in view will move the previous question.

The call for the previous question was sustained; and the report of the Committee as read was adopted.

AMMONIA.

The President—There is a subject connected with gas manfacture which is of great interest to all of us, concerning which little as yet has been said. There is a gentleman present who is able to deal with that subject in a most entertaining and instructive way. I call upon Mr. Page to give us some information upon ammonia.

Mr. George Shepard Page (New York.)—You will bear me witness, Mr. President, that when kindly invited by you to make some remarks upon this subject I earnestly declined.

The President—I know that you did, but we want to hear from you nevertheless.

Mr. Page—From causes which were perhaps beyond my control, I feel that I have already occupied too much of the time of this association; and it would surely be a trespass upon the courtesy of a new acquaintanceship, and perhaps endanger some old acquaintanceships, if I were to occupy even a little more of your time and attention. I cannot but feel the honor and the kindness of the wish which you have expressed; and I will, in response, say a few words upon the subject of "Ammonia," with a view of introducing a discussion upon a subject of so great interest to every gas man. It is a subject which is beginning to assume great importance to every American gas manufacturer, and it will probably, at the expiration of three or four years more, have reached the tremendous proportions which it now occupies in connection with the gas industry across the water. When I tell you that the average receipts of the English, French, Belgian and German gas companies reach 65 cents per ton of coal carbonized, for the ammonia contained in the coal; and when I tell you that in the United Kingdom alone, 9,000,000 tons of coal are carbonized every year, which multiplied by 65 cents, gives the enormous sum of $5,850,000, as now obtained in that country from the ammonia product; and when I tell you that the carbonization in the United States now reaches the figure of 3,000,000 tons per year, and the receipts from ammonia in this country are but 10 cents per ton of coal carbonized, or $300,000 per year, as against the $5,850,000 now actually obtained on the other side of the water, you will at once see the vast sum which is yet to be grasped in this country by the gas industry, and which may be used—for what? To enable you to reduce the price of gas, thereby increasing the consumption, and enable you to make larger profits. This receipt, on the other side, is not [illegible] to the Chartered gas light and coke companies of London, who, with the enormous carbonization of 1,300,000 tons per annum, of course, [illegible] up a great sum to the credit of ammonia; but I failed to find a single company during my visits abroad carbonizing so much as 200 tons of coal that did not realize at least 40 cents per ton of coal carbonized. Therefore, this brings it before you as a matter of interest, to those engaged in the smaller way, in gas making. Then there is the additional fact that we have a home market in some respects better than the market abroad for this product. Because a large percentage of the ice in the Southern States is now being made by the use of ammonia—the ammonia process being far cheaper than the sulphurous ether of the other processes. Indeed, a manufacturer of Louisville, whom I met yesterday, through the courtesy of Mr. Prichitt, sells all his ammonia product for the purpose of making ice. He is now considering the establishment of manufactories in the South, at points where there may be a carbonization of coal, simply for running that branch of the use of ammonia. But that is a very slight percentage in comparison with the demands for fertilizers. In many of our States the law compels the fertilizer to contain a percentage of ammonia which is printed on the packing. If it does not, I believe, in one of the States, at least, the manufacturer goes to prison; at any rate, your own growers of sugar, tobacco, corn and potatoes, have generally become aware of the fact that without ammonia, no matter what may be the other ingredients—without ammonia, the crop may be an entire failure; therefore, the ammonia is being looked after. The great competitor in the supply of ammonia for fertilizers, is nitrate of soda. It has been obtained from blood heretofore, but there are many uses now for blood, which makes it too expensive. Nitrate of soda can only come in competition with sulphate of ammonia when the price of the sulphate exceeds 4¼ or 4½ cents per pound. Below that, the manufacturer of fertilizers goes for sulphate of ammonia as the only source of supply. Sulphate of ammonia is to the buyer a safer investment than the purchasing of blood or the nitrate of soda, because the ammonia from the sulphate put into the fertilizer stays there till it enters the soil, and the rain comes and it is deposited. The nitrate of soda deliquesces, and the ammonia passes off. It is almost impossible to hold it. Sulphate of ammonia may be laid away for many years, 25 per cent. of its contents—ammonia—is there. So that as surely as there will be a demand for coal gas twenty years hence, as the lighting and heating medium in this country, there will be the demand for ammonia. Therefore, it seems to me that it is a question that should be looked into carefully by every one in charge of gas works, for the purpose of examining and knowing—as can be easily learned—how it may be obtained, and what demand there is therefor, with a view of putting it into the market and obtaining something for it, instead of permitting it to go to waste, running it into the river and causing a nuisance to the neighborhood. This is the question you want to ask the present manufacturers of the sulphate of ammonia. Ask them in writing—say, Mr. ————, in Chicago Gas Light Company's Works, or Messrs. ———— ————, who have the contract here and at Cleveland, or to Messrs. Porter & Lee, at St. Louis, or to Mr. Symington, at Baltimore, or to Mr. Young, of Pittsburgh, and ask them what they will pay you per gallon for 10, 15 or 20 ounce liquor. They will buy it every time. Because they know when you say 10 ounce it means that adding simply 10 ounces of sulphuric acid will make 13—nearly 14—ounces of sulphate of ammonia, which will be worth to them about four cents. They know it just as certainly as you know the quality of the gas you are making, and I suppose you all know that to the point of a pin. So, in order to determine what you will receive for ammoniacal liquor, get that reply. If parties reply to you that they cannot pay over 1½ cents or 2 cents—that they cannot pay at least two cents per gallon, and pay transportation of the empty barrels to your works, and of the full ones back to the sulphate works, then they are not willing to give you a price which will leave them 15 to 20 per cent. profit above that. The figures demonstrate this beyond question. I believe that any manufacturer of sulphate of ammonia will be very willing to pay a fair price; but once beginning in this way, if then your carbonization equals, say, 5,000 or 8,000 or 10,000 tons, it has been demonstrated, by hundreds of gas managers on the other side of the water, that it pays better to use the labor you already have, which is all that is required, and the little plant which is required, and work it upon the premises. Bring the sulphuric acid to your works, make the sulphate for yourself, and there is as stable a market for that as there is for wheat. [Applause.]

Mr. J. R. Smedberg (Lancaster, Pa.)—I would like to give the experience of the San Francisco Gas Company on this point. During the year 1873 I was making some experiments in regard to the strength of ammoniacal liquor. An Englishman came in to see me, and watched me for some time, with the acid tests which have been mentioned—the saturation by sulphuric acid. He said, "Are you aware that in many of the small towns in England they make aqua ammonia without the production of intermediate resultants?" It was news to me; there was no such thing in the books; on the contrary, they all said that the entangled matter fouled the aqua ammonia to such an extent that a preliminary crystallizing process was indispensable. I had a talk with him. He told me that in many of the small towns of England ammonia was sold on tap at every corner grocery. We spent, first and last, about $3,000 on our ammonia section. We started on the theory that a 16-ounce liquor was required; in other words, that it took 16 ounces to saturate the English gallon. After finding that the special purification process which I was using was effective, and did take out the offensive oils, I sent samples to every grocer in town. The result is that in San Francisco, to-day, you can buy a pint of good, fair strength of ammonia at 25 cents; and all the ladies, and particularly the hard working women of the town, go just as regularly to their grocer for ammonia as they do for flour. The San Francisco company makes a number of grades, the first of which is a boiler cleansing preparation. It was an accidental discovery of mine, and, I thought, an original one, that the water from the immersing tank of my multitubular condenser never scaled. There was no scale made at our King street station. Just at the time I was taking a patent out I found a statement that the Frankfort (Germany) works had precisely the same experience. I was therefore balked on the patent. But they are selling it by the carboy, of pretty full strength, to many stations on the Central Pacific Railroad, where they are bothered with alkaline waters. In the next place, the San Francisco Gas Company is exporting these aniline oils to Honolulu, to Mexico, and to Southern California as an ice-making material. The next grade is what is called washing ammonia, which is free from these oils; and the company is now making a pharmaceutical preparation, which goes to the drug shops, and which is made directly from the liquor without any inter-

mediate crystallizing process. I know of one manufacturing firm in this country, handling all the liquor from a very heavy station, which prefers to have its liquor 6 ounces. I prefer to have it 26, if it can be obtained. The only thing I want to point out to you is this—the possibility of a different outlet for ammoniacal products, other than that of any of the salts which perhaps Mr. Page has been familiar with. He certainly ought to be familiar with it, but omitted to mention it—and that is a preparation of the direct liquid compounds of ammonia. I do not remember the exact amount that we made there per ton; but we were bothered by bad scrubbers, and my directors refused me any of the modern scrubbers; so that, though I remember using about 70,000 tons of coal per year, our profits were about 75 cents per ton. When Mr. Page mentions 60 and 65 cents per ton, I suppose he means gross, and not net income.

Mr. Page—I mean net. I will give the figures taken from the London *Journal of Gas Lighting*, showing the receipts of certain gas companies across the water. And, by the way, perhaps it is not known to you that a parliamentary law requires that, twice a year, every gas company coming under a certain act must publish its reports, showing the make of gas, the amount received for gas, the purchase of coal, the amount paid for coal, the coal tar produced, the amount received for coal tar, the amount of ammoniacal liquor produced, and the amount received for it. I have, for many years, collated those reports, and I will give you a few extracts, from some that are on record, and can be found by turning to the London *Journal of Gas Lighting*. Leeds, England, reports that they obtained, for the liquor alone, 75 cents on the ton of coal carbonized; the London Gas Company last year obtained 60 cents per ton of coal carbonized; the Commercial Gas Company, 60 cents; the South Metropolitan, 62 cents; the Tewksbury—a small company carbonizing 8,000 or 10,000 tons—the sulphate of ammonia paid for the coal; in Birmingham the ammoniacal liquor, one year, brought in $246,847; Bradford, $55,144; Sunderland, the residuals nearly paid for the coal; Peterboro, comparatively a small place, 60 cents per ton of coal carbonized; Manchester, $163,387; South Metropolitan, $225,758; the Crystal Palace Company, a company carbonizing only a small amount, received $81,120 for ammoniacal liquor; the Chartered Gas Light Company, London, $792,175 for ammoniacal liquor.

Mr. T. G. Lansden (St. Louis, Mo.)—Do not English coals contain a larger amount of ammonia than the coals of the United States?

Mr. Page—I am glad that Mr. Lansden has asked that question, because it is one, of course, in the minds of many gentlemen present. It has been published that American coals do not contain as much ammonia as English coals. The fact is that the Youghiogheny coals are very much like the Newcastle coals. My friend Mr. Butterworth has said that the similarity is exceedingly great; and the nitrogen reported from Newcastle coals is 1.72 per cent., which is just about the percentage of nitrogen reported by the companies mining the Youghiogheny coal. In naming this percentage of nitrogen, the fact is to be remembered that 25 to 28 pounds of the sulphate per ton of coal carbonized, which is being made already from Westmoreland, Penn, and Youghiogheny coals, by two or three manufacturers of sulphate in this country, is not exceeded except in one or two places in England, where 32 pounds have been obtained from a coal containing more nitrogen than 2 per cent. But is it known to you, gentlemen, that the coke contains 3½ times as much as the ammoniacal liquor obtained from the condenser, the hydraulic main, and the scrubber, that is utterly wasted? In other words, the one ton of the sulphate of ammonia (of the value of $100, obtained by the present appliances, from 100 tons of coal) is the ammonia obtained from the ammoniacal liquor. By securing all the ammonia of both the coke and the ammoniacal liquor, we could gain a profit of $3.50 per ton as against $1 per ton. That has been brought out in the past year by a paper read before the Gas Institute, in England, by Professor Foster, of London, who, knowing that there was 2 per cent. of nitrogen in coal, was employed by the South Metropolitan Company to find it. He hunted for it, and found that additional percentage in the coke; and the rest, of course, must be in the gas in a fixed form. Steps are now being taken on the other side to recover the ammonia which is in the coke, and the experiments thus far have been successful. Putting the ammonia which is obtainable from the ammoniacal liquor and the coke, with the tar and other residual products, the result will be that the coal itself will be paid for, and there will be a margin on the credit side; and on the basis of these probabilities we are safe in predicting that the day is not very far distant when the gas will be the residual product. [Applause.]

REGENERATOR FURNACES.

Mr. E. J. King (Jacksonville, Ill.)—I, for one, was not satisfied with the length of the discussion on the regenerator furnace. I notice Mr. Fullager in the room. He has had large experience in the use of regenerator furnaces, and I would suggest that he give us the benefit of that experience.

Mr. J. Fullager (Cincinnati, Ohio)—I have prepared nothing on the subject, and my remarks will necessarily be crude. I will, however, answer one question which has been asked as to the life of the retorts under the regenerator principle. I will state that 3½ years ago, on a visit I made to inspect the Siemens iron furnace, it occurred to me that I could modify that furnace and adapt it to our works. Accordingly I built a small furnace, 12 inches wide and 3 feet deep, and filled it with hot coke. I was very successful with the furnace. Those retorts stood for three years, making 7,500 feet per day, with charges of 250 pounds, in four hours. The retorts were in comparatively good condition when I took them down. After the flood rose in the furnace I had to take it down. The year following I put up 18 benches. They have now been running for 18 months, and I expect to get another year out of them. They were only 3-tile benches, which was a mistake. In the last 18 furnaces I put six blocks. I expect to get four years' service out of them. One of the gentlemen spoke about keeping tiles out of the benches. If you put in regenerator benches you want to make them almost solid with tile. You want tile not more than 9 inches apart. If this is not done your benches will not last as long as they should. That thing was proved in Boston and in Baltimore, and also, I think, in Providence. I am building, this year, 34 more benches on the same plan. There is a little trouble with regenerator furnaces which I have had to get rid of, and that is pitch in the mains. In that system of firing it has been the custom to try and get all we can out of it. We hear men talking about getting 10,000 feet per retort. You can get that without any trouble; but after you have had that for a week or so another trouble arises—that of stoppage of the pipes. I have had as many as 76 a day in trying that business. We ran 3-hour charges, with 250 pounds; and after running on the third day I had to put on 25 men to jump the pipes and take them down and burn them out. I went back to 4-hour charges, and without reducing the heats; but this did not help much. I then brought the heats down so as to burn out 250 pounds in 4 hours, but was satisfied with less than 5 feet. Then the pipes commenced stopping. We have had no other trouble with them of any account. On the hydraulic main we have; the ascending heat turns everything into pitch in the pockets. I am now building a main that we can clean out at any time, whether the bench is at work or not. I have a sketch of it with me, which I will pass around. I think with this main, and using that number of benches, we will have no trouble. Another gentleman said these furnaces will not do for small works. I say they will, if you do not attempt to build full furnaces. If you attempt to carry 6 feet depth of fuel, you cannot use it for small works. But you can bring them down to 2 feet 6 inches, if you will have the combustion chamber where it is at present, and keep the coke 18 inches below the combustion chamber; then 2 feet 6 inches or 3 feet of fuel will give you all the result you want for small works. You can burn up 250 pounds in four hours. A great many people use coke; but Illinois coal will burn in those furnaces and give a perfectly white flame, without injuring the retort. I think, as far as those benches are concerned, you will all adopt them inside of three years, and forget the present system of firing. Two years ago I had to put on 20 or 30 extra men. I could not get good firemen. The men would go in and charge the fires, and then sit down alongside of them. When spoken to about it they would say, "We won't attend to such work as that;" and they would leave. The moment I put those benches to work I had the best of firemen. You do not need any firemen; all you need is to put the coal into the retorts and draw the hot coke direct into the furnace. One man can attend to 18 benches. You only need to clinker them once in 8 days. By putting in steam, and directing right, you can put in a little rod and pull the clinkers right out in a lump. Once in a long while it will catch in the furnace, and have to be cut out. But once in 8 days will do all that work. In some of the furnaces I have seen at the East I have found them clinkering every 2½ hours. Men would drive in iron bars, pulling the clinkers out on the bottom of the furnace, take the iron out bars almost melted, and put in a new set of bars. The steam does away with all that, and it takes but very little work; and, as far as the firemen are concerned, you have the best of them the moment you put the furnace in. Never let the heats get too great. Do not shake the furnace up at all; let the ashes collect for 8 or 10 hours, then shake out what has collected, and go ahead again.

Mr. J. Gimper (Leavenworth, Kan.)—What Mr. Fullager says has been our experience also. So far as the firing is concerned, as I have said in my paper, I am satisfied that the extra expense we have incurred in putting in the regenerators is more than offset by the saving of labor effected in firing. If you gain nothing else than the saving in labor, to say nothing of the saving in fuel, it is economy to use this furnace. You can keep better men, for they see the advantages of it. Before we introduced it our men had to poke the fire and clinker out every hour, and then put a charge in. This was enough to cut any man right down. As I said yesterday, we could not keep house without this furnace—we would not attempt it. I have had the same firemen in the works for twelve years.

Mr. Fullager—In looking over different plans for regenerator benches you will see that they are all very expensive. But there is no occasion for any great expense. Is you will carry a simple air chamber behind the flue, and

allow the air to pass into that and then come to the front, you will do away with all expensive work, and accomplish the same purpose. You can get rid of all expensive work by simply leaving an air chamber behind the bench. That is all the heat it wants. You can not pull it down from above unless you will put up a heavy stack. Another point is the saving of coke. You will bring your coke down from 45 to 30 per cent. the moment you build the benches. I am not speaking now of measuring or weighing coke. I charge 250 pounds of coal per retort, in six retorts, and I draw 1½ retorts into the furnace. It is easy to figure up what the percentage is, without weighing or measuring. And in a bench of eights I use the same amount of coke—1½ retorts to a bench of eights, and burn 2,400 pounds to the bench.

REPORT OF THE COMMITTEE ON RESOLUTIONS.

Mr. Schofield, chairman of the committee appointed to draft resolutions expressive of the thanks of the Association for courtesies and entertainment, read the following report:

Mr. President:—Your committee appointed to draft resolutions expressive of the sentiments of this Association for the generous manner in which we have been entertained during the sixth annual meeting of the Western Gas Association in the city of Cincinnati, respectfully submit the following:

Resolved, That our Association hereby tenders its cordial thanks to the Cincinnati Gas Light and Coke Company, the Stacey Manufacturing Company, Messrs. Taylor & Anderson, the Cincinnati and Newport Iron and Pipe Company, the Phillips Meter Company, the American Meter Company, the Marmet Coal Company, Messrs. Jos. Walton & Co., Messrs. Galway & Smith, Messrs. T. B. Stone & Co., Messrs. Dan Stone & Co., Mr. W. H. Brown, and especially to Messrs. Henry Ranshaw, John Fullager, and John Anderson, the local Committee of Arrangements, for the kindly courtesy and boundless hospitality tendered to us during our visit.

Resolved, That a similar acknowledgment is due for the attentive kindness shown by the proprietors of the Burnet House.

Resolved, That the Secretary be and is hereby instr :cted to transmit a copy of these resolutions to each party above named.

(Signed) L. K. Scofield, Jas. R. Smedberg, E. Lee Brown, J. M. Starr, G. A. Hyde, } Committee.

On motion, the report was accepted and adopted.

GAS HOUSE LIME.

Mr. E. L. Brown (Chicago, Ill.)—I would like to offer a resolution, but before offering it, I wish to allude to an inquiry I made three years ago in Chicago, at the first meeting of the Association which I attended. I asked if any member of the Association had tried the fertilizing or the non-fertilizing qualities of gas house lime. At that time no one could tell me anything about it. The only answer I got was that gas house lime would kill vegetation. It seems to me that gas house lime contains quite a number of ingredients useful to vegetation; so I tried experiments myself. I make, at my place, about 150 tons of fertilizer. I make a compost pile 30 feet square, 6 to 8 feet high, of manure, leaves and refuse of all kinds; and in that 150 tons I put 2 tons of old salt got from the hide works, and about 5 tons of gas house lime, and I find the result quite satisfactory. It assimilates perfectly. I get the lime, which I want. I get ammonia, and some tar, which does no hurt. Has anybody else tried it? The resolution I wish to offer is that the thanks of the Association be tendered to the Press of Cincinnati for the very satisfactory reports made of the proceedings of the Association.

The resolution was adopted.

Mr. T. G. Lansden (St. Louis, Mo.)—I can give my experience with the use of lime. I used it in the way described by Mr. Brown. I noticed that, in certain soils, which already contain too much lime, it was a failure; but with soils that need lime, if there was a layer of a half inch, and no more, spread on the ground, and then turned under, after lying on the surface all winter, it worked well as a fertilizer. Mr. Mitchell showed me a garden where it had been successful, but in another place, where it had been used in excess, it killed everything.

Mr. E. J. King (Jacksonville, Ill.)—I would like to ask Mr. Fullager a question. Inasmuch as from our location it would be impossible because of the spongy condition of the earth to go down any distance in constructing a regenerator furnace. I have had it in mind to try an experiment, and would like his opinion as to probability of success. I have thought of making a supplementary air flue under the end of the retort, having an adjustable stopper at the end to supply the requisite amount of air; and on the outer side from the fire to go back to the back of the flue, across behind the fire box, and come in on the under side, discharging the air just above the coke. Would there be any advantage in introducing hot air in that way?

Mr. J. Fullager (Cincinnati, O.)—That draws the heat right out from the flues, and you have only to supply it again. If I were in your position I would do as was done in Providence on a piece of spongy ground. You could build a wall and make it water-tight and keep your furnace just the same. You need go down only four feet. The Manhattan Gas Company are putting down a concrete bed, and building the furnace right on that.

Mr. King—In that case how would the men work below?

Mr. Fullager—All they have to do is to go down, open the door, shake up the fire, and clinker once in eight days. You would have three feet depth or fuel, and have one foot depth for your ash pan.

Mr. George Shepard Page (New York)—I had hoped Professor Douglas would answer the question of Mr. Brown, in respect to the reason why waste lime cannot be used as a fertilizer. Lime is so overcharged with the sand and impurities gathered from the coke (which are destructive to vegetation) that it has been found impossible, except where a limited quantity is used, to prevent greater injury than there is advantage gained by the ammonia which is contained in the spent lime. So that in New York, the Metropolitan and Manhattan Gas Companies are at considerable expense to to have their lime taken away. I believe they have made a proposition recently to give it to any one—to any parties—who will take it away, delivering it to them on scows. Most of the gas companies, in the countries I have visited, think that lime is comparatively a waste product. It has been used to make concrete walks and for that purpose it answers well. I had an opportunity, too, of seeing that demonstrated at the South Metropolitan Gas Company's Works. Large piles of the spent lime were lying there, and the only way they could dispose of it was by having a chemical analysis made; and if the specimen contained more than a certain percentage of cyanogen compounds, the lime was rejected as valueless.

Mr. Fullager—How do you account for the fact that, on the main line of the Pennsylvania Railroad, and in Maryland, Long Island, Delaware and Virginia, they will take all of the foul lime that they can get; canal boats and schooners are actively employed in transporting it. The trouble of disposing of it in New York was the difficulty and expense of holding it until parties wanted it; as they will only take it after the harvest is over, and before December or January. I remember the time, in New York, when lime was sold at 3 cents per bushel. And it was all we could do through the winter months to load the scows and schooners that came there for it. It was the same in Baltimore. There was great demand for all the lime that could be furnished there; and the same was true in Philadelphia. The trouble in disposing of lime has been the difficulty attending its storage in large cities. The Boards of Health would not allow it to be stored within the cities. If you will read "Blake's Report on Lime" you will learn that it is one of the best of featilizers; but that was written at a time when more ammonia was contained in the lime. There used to be a time, a few years ago, when washing did not amount to anything. Two-thirds of the ammonia was taken out at the purifiers. Now we do not allow it to leave the scrubbers. I have never been able of late to find ammonia going into the purifiers. If you will allow a little ammonia to go into it, you can sell the lime.

Mr. Page—That statement is correct. The value of the lime has depended upon the amount of ammonia it contained, and hence certain results would be gained by the use of it upon lands which were deficient in ammonia. I have conversed with many farmers who have used it, and were competent to speak of its value as a fertilizer, and the conclusion I have reached is, that by far the greater portion of the lime thus used was absolutely spent lime, and therefore valueless.

Mr. King—I think the most satisfactory way of disposing of spent lime is to sell it to the brick makers. My experience is that, when pulverized, it makes just as good mortar as lime which has not been used for the purposes of purification. I have often wondered why it was not more generally used. It is well adapted for sewer and other underground work. At first it is green in appearance, but it soon loses that color, and the mortar looks like that made from other lime. I belive that it sets even better than other lime. I think that, in New Orleans, they press it with rollers, and sell it to the brick makers at remunerative prices. We dispose of all our lime for that use, at 50 cents per load. I think that brick makers will find it almost as valuable as the lime they are now using.

Mr. Page—It may be that in the spent lime there is untold wealth awaiting gas men. A distinguished chemist has recently obtained a patent for its utilization. The cyanides are the base of Prussian yellow, which is worth 25 cents per pound. The formula furnished me for obtaining this substance seems to possess merit; and if so, it will give a value to that which has heretofore been deemed worthless. Spent lime also contains sulphur, from which sulphuric acid can be made. It seems as if there were no end to the discoveries in this industry of gas making. It is probable that gas making, and that which pe tains to it, is the most remarkable industry of the age.

On motion of Mr. Lansden, the thanks of the Association were extended to the President for the able and impartial manner in which he had presided over the meetings of the Association.

On motion of Mr. Brown, the thanks of the Association were tendered to the Secretary for the courteous and efficient discharge of the duties of his office.

The President—I thank you, gentlemen, most sincerely for the attention you have given and the interest you have manifested at this meeting of our Association. The occasion has been most enjoyable to me, and I think it has been equally so to all of you. I think I am within bounds in saying that this has been not only the most enjoyable, but also the most entertaining and instructive convention yet held by the Western Gas Association. We have all been greatly benefited by the information given us in the papers which have been read and in the discussions which have followed. We return to our homes feeling that we have been, from the knowledge here acquired in respect to the industry of gas making, enriched in almost every particular. That the next meeting may be as largely attended, and the interest manifested be as great, is the wish of your President.

There being no further business, I now declare the convention adjourned *sine die*.

The Management of Small Gas Works.

By C. J. Russell Humphreys.

[Continued from page 34.]

It may with perfect truthfulness be said there is no more efficient help to a small purification account than large purifiers; and, conversely, small purifiers subtend a large purification account. To hurry the gas through the boxes means to utilize only a part of the lime before throwing the purifier out of action; on the other hand, if the area of the vessel be such that the gas may, so to speak, tarry a while in its transit through the apparatus, then we may expect, unless some egregious blunder be made, the lime to take up its due proportion of the impurities contained in the gas, and to be "spent lime" in the true meaning of the term.

But we are using indefinite terms; we are speaking of slow speed and rapidity of flow of the gas. What are the strict definitions of the phrases as applied to the present subject? Let us study the matter a little. A purifier house is usually made to contain four vessels, three being always in action, the remaining one idle; each box contains five layers of trays. When this method of working is adhered to, Newbigging lays down the rule for ascertaining the proper size for each purifier: multiply the maximum daily make of gas, expressed in thousands, by the constant .6, the answer being the superficial area of each box, in feet. Thus, we would apply the rule to a works of 100,000 feet a day; $100 \times .6 = 60$, the area of each purifier; then each vessel could be 7½ ft. by 8 ft. Let us now ascertain what the speed of the gas would be were this rule adopted. In a works of the size taken, the average hourly make during the time of maximum consumption would be 4,170 feet, and there would be but little variation from this figure during each of the 24 hours, because, having 15 retorts in action, the charges could be so regulated as to make the rate of distillation about uniform. The speed of the gas per square foot of purifier will therefore be 70 feet per hour. This is what we would call moderately slow purification. If, however, we attempt to force 150,000 feet per day through these boxes, the velocity of the gas for the same unit would be 104 feet, which would not allow sufficient time for the perfect reaction between the lime and the impurities to take place. We said that in a works of the size just alluded to the rate of manufacture would be quite uniform throughout the 24 hours. This is true; but in a much smaller works the remark would not hold. Let us, then, take the case of a works of 25,000 feet maximum consumption. The average hourly output would be 1,040 feet; but as only one bench of fives would be in action, the rate of distillation would vary greatly from the average. Thus, during the first and second hours of the charge the hourly rate of distillation would be about 2,000 feet. It therefore follows that if we were to plan the purifier on the same principle as in the previous case, the speed of the gas per foot of purifier area would be 133 feet per hour, or 2.2 feet a minute. This would manifestly be so high a speed as to prohibit good results. The rule which we would suggest is that the size of each box be such as to make the maximum speed of the gas one foot minutely per square foot of purifier area.

To apply this rule we may take a works of 25,000 feet maximum make. We have only to ascertain the maximum make of gas per minute, which will be 33 feet, and we have the area of each purifier. A series of boxes 6 ft. by 5½ ft. will answer the requirement.

We would further question the wisdom of making purifiers, even for the smallest works, of a less area than 30 square feet, preferring two purifiers 6 ft. by 5 ft. to double that number of vessels of 4 ft. by 4 ft. Of course, where only two boxes are used, they should be worked by slide valves, or, better, by a pair of four way valves.

In lieu of using five 1½ in. layers of lime, we would recommend two sets of sieves, each with 4 inches of purifying material. We can see no excuse for dividing the lime into five thin layers, as it entails more labor both in making and stripping a box, and the results obtained are inferior to those which prevail when the depth is doubled or trebled. We have tested this matter practically, running under the same conditions, save that at one time the thin layers were used, while later the heavier ones were employed; the result showing an improvement of fully 12 per cent. in favor of the latter plan. Moreover, we do not find any increase of back pressure from reducing the number of sieves.

Finally, the lime should be thoroughly wetted before being placed in the boxes; and by this is meant not merely sprinkled until it assumes a consistency that will retain the impress of the hand, but so soaked as to border on the state of mortar; or, putting it more precisely, a bushel of very dry lime, slacked, in a dusty, powdery state, will weigh about 53 pounds, and it will take about 28 pounds of water to make it suitable for the purifiers. This is a very important matter; for while it is true that it is the lime, and not the water which purifies the gas, it still holds that the water is a necessary go-between. Gas may be passed through dry, powdery lime with little change to either substance; but when water is added the chemical changes commence in earnest.

The Forstall method of preparing lime for the purifiers is so well known that it is unnecessary to describe it here; it will be all sufficient to remark that the main feature of the system consists in making the lime very wet, and then passing it through a ¾-inch screen. By this mode of working, the lime can be used in a much wetter condition than by the ordinary method.

We have now to consider the question of oxide of iron versus lime for purification. The material is know as the hydrated peroxide of iron, or, in chemical symbols, $Fe_2O_3H_2O$; and it unites with the sulphuretted hydrogen of the gas to form the proto-sulphide of iron. Thus—

Hydrated Peroxide of Iron.		Sulphuretted Hydrogen.		Proto-sulphide of Iron.		Water.		Sulphur.
$Fe_2O_3H_2O$	+	$3H_2S$	=	$2FeS$	+	$6H_2O$	+	S

The advantage this material has over lime is that, after having absorbed its due proportion of sulphuretted hydrogen, it may be revivified by exposure to the air, and so be used over and over again. On the other hand, this substance has no affinity for carbonic acid; so this impurity must be allowed to remain in the gas, or else it will be necessary to use lime along with the oxide. The seriousness of this drawback to the iron method will be conceded when it is remembered that there is three times more carbonic acid than sulphuretted hydrogen in the gas, and when the former impurity is allowed to remain the illuminating power of the gas is reduced by about one candle.

If a gas company be under obligation to supply gas of a given quality, the iron method of purification must be debited with the expense of raising the brilliancy of the gas one candle. This amount will depend upon the relative cost of caking coal and cannel at a given works, and will also be influenced by the standard at which it is incumbent to maintain the quality of the gas.

We trust there are no gas works in the country where the purifiers are worked on the rule-of-thumb plan of turning on one each week in summer and two a week in winter, without regard to the lime being used up or otherwise. We presume that even in the very smallest works there is a bottle of acetate of lead in the purifying house; so it is rather superfluous for us to remark that each purifier should be furnished with small cocks, and the gas tested thereat by allowing a stream of it to impinge on a piece of paper previously soaked in acetate of lead. If the color of the paper remain unchanged, the gas is still pure; should it change to a brown hue, it is clear that the gas contains sulphuretted hydrogen, and a newly filled purifier should be brought into action forthwith. A good plan is to have two sets of test pipes brought from the purifiers into the office. One set should be from the outlet of each purifier, the other should be taken off just below the top tray of each box. By this double arrangement the purifiers can be worked very closely; that is, one need never be thrown out of action until it has done its full work, and at the same time there is no chance of the gas becoming foul; there is a risk of this occurring where the test is made only at the outlet of the purifier.

The test for sulphuretted hydrogen should be of a continuous nature, allowing a minute stream of gas to flow through a glass globe containing an acetate of lead paper. It is not necessary to test for carbonic acid, because the lime has a greater affinity for that impurity than it has for sulphuretted hydrogen, so that carbonic acid will continue to be absorbed even after the acetate of lead paper changes color.

We may remark, however, that carbonic acid can be tested for by allowing a stream of gas to bubble through some lime water, when, if this impurity be present, the liquor will become cloudy. It may also be as well to add that a yellow turmeric paper changing to brown indicates the presence in the gas of ammonia.

[To be continued.]

A Drop of Blood.

A man by the name of Okerburg was badly poisoned by inhaling gas in the hotel St. Andre, on Eleventh street, this city, and when found was in an unconscious condition. The physicians called in to prescribe for him decided to try the transfusion of blood into his system; and, after taking blood from him, injected 8 ounces of blood from a healthy negro into his veins, and thus brought about recovery. This, we think, is the first instance where the transfusion of blood has been resorted to, to counteract the poisoning of the blood by carbonic oxide. Pure oxygen has been forced into the lungs, and the poison thus nullified; but we have heard of no case previous to this where the transfusion of blood has been brought into use.

The singular part of this affair is that, after Okerburg's recovery, the negro made a demand upon him for the blood he had furnished from his own body, at the rate of 10 cents per drop, or $192 in total. This was by estimating the blood at 240 drops to the ounce, the negro claiming remuneration for 8 ounces of the vital fluid. This amount Okerburg refused to pay, and the negro brought suit against him, before Justice Kelly, getting a judgment for $197.90, and $12 costs.

As the operation mentioned above is an entirely new remedy to counteract the effect of this poison, why would it not be well, considering the alarming

number of deaths and cases of suffocation (which almost always terminate fatally) from the inhalation of water gas, to have, say at each of our dispensaries, a few healthy colored individuals on tap, as it might be termed, with fixed prices per drop or ounce for the vital fluid, and thus avoid litigation and, at the same time, be better prepared for emergencies?

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

The Bower-Grimston Regenerative Gas Burner.—We take pleasure in announcing that the proprietors of the English and American patents covering this valuable invention have arranged with Messrs. George Shepard Page, of this city, and John Bower, of Rochester, N. Y., to introduce the same in this country. The wide aquaintance of the former named gentleman with the fraternity, coupled with his well-known enterprise and energy, guarantee rapid developement of the new industry. Mr. Bower is a brother of Mr. George Bower, of St. Neots, England; and has been for several years a prominent and highly respected resident of Rochester.

If They had All Done as Well.—Mr. C. W. Hinman, the Massachusetts State Inspector of Gas and Meters, and one of the team chosen to represent the United States Militia service in the international rifle-match at Wimbledon, England, which took place on July 20 and 21, acquitted himself nobly. He is credited with the second-highest score on the American side; and had the rest of the "shooters" but done as well that minus 45 points would not have been recorded. You can always count on a "gas man" being pretty near the "top."

Improvements at the New Castle, Pa., Gas Works.—The retort house, condensing room, engine room and offices of the New Castle (Pa.) Gas Light Company are being overhauled and improved. A new range of benches of sixes, on the most approved plan, figures among the additions. The work on the benches is being done by Messrs. Taylor and Anderson. Some three years ago this same company erected a new purifying house and meter room, as also a holder. The officials in charge of this company's affairs believe in keeping everything in ship-shape order; and wisely conclude that the slack summer season is the proper period to prepare for winter's busy time.

Service Pipe Fused by an Edison Illuminating Wire.—Among other "dead sure" things claimed for the Edison System of incandescent electric lighting is the utter harmlessness of the current—it having been asserted over and over again that by no possibility could serious danger arise either to person or property from contact with the same. The "harmlessness" and the "weakness" of the Edison current is rather clearly shown by the following illustration which is an exact reproduction in wood of a photograph of a service pipe which formerly led into the buildings Nos. 121 and 123 Front street, New York city. Mr. J. W. Phyfe, who has his offices on

the first floor of the premises mentioned, uses the Edison light for purposes of illumination, the rest of the building being supplied with gas from the mains of the New York Gas Light Company. The gas service pipe was two inches in diameter, and entered the building alongside of the Edison supply wires. As nearly as can be ascertained (for the investigation subsequently made proved nothing conclusively) one of the electric light wires became grounded, and the electric current coming in contact with the gas pipe quickly reduced it to the condition as seen in the engraving. The escaping gas became ignited, causing an explosion, and setting fire to the premises; the flames were easily and speedily extinguished, so that no great amount of pecuniary damage ensued. This is mainly of interest from the fact that it entirely upsets the "perfect safety" theory so often advanced by Mr. Edison and his confreres.

Gas Matters in Toronto, Canada.—The Consumers' Gas Company, of Toronto, Canada, has just completed the erection of a very extensive shed for the storage of coal; work is at present being prosecuted on the resetting of four benches of sixes. The old barrow system of hauling coal into the retort house has been abandoned, and the buggy-system instituted in its stead. Toronto has but seven "arc" lights in use, and there is every likelihood that even this number will decrease in the near future.

Gas Explosion in San Francisco.—On June 28 an explosion of gas occurred in the building No. 333 Hayes street, San Francisco, Cal. Some work had been done during the day on the gas pipes in the building, and the plumber "kindly" left one of the pipes uncapped. The smell of escaping gas led Thomas Dryden to institute a search for the leak; and, just as he had found it, encountered Alfred Tucker bent on the same mission. The only difference between the two methods of search was that Tucker carried a lighted candle to assist him. Judging from the after effects the candle "found" the leak just about the same time. A severe explosion ensued, and both men were severely injured; the store front of the building was torn out, and considerable damage done. People are sure to "find" gas leaks when they carry a naked light to assist them in the "hunt."

New Works at Lindsay, Ont.—Lindsay, Ontario, is to have a gas works. The Lowe system is to be employed, and the work of erection was begun in June.

Electric Light for Richmond, Va.—At the meeting of the Richmond Common Council, held July 5, the Finance Committee recommended that the Brush Electric Light Company be allowed to erect poles and wires in the city limits subject to certain restrictions. Councilman Pizzini thought it was a shame that small towns in Georgia and Texas should have electric lights while Richmond should be left to grope in darkness. Councilman Curtis was opposed to allowing any electric light company to erect poles or string wires in the city. He said that the Council had appropriated $25,000 to remodel the gas works, and now he thought it wrong to allow an electric light company to come into the place and endanger the city's revenue as the owner of her gas works. In reply to the last statement of Mr. Curtis, Councilman Pizzini said the finances of the city would not be in any manner endangered, and Councilman Clarke stated that electric lights never caused a decrease in the consumption of gas. Councilman Higgins moved that the matter be referred to the Committee on Streets, but this was defeated. A vote being taken on the original recommendation resulted in the recording of fourteen in the affirmative and ten in the negative. By all means, let them erect poles and string wires in Richmond, Va.; but, gentlemen, don't invest any money in the capital stock of the electric light ng concern.

Stockholders Getting Uneasy.—A despatch to the New York Daily *Herald*, dated Chicago, Ill., July 22, 1883, contains the following:

Stockholders representing over $500,000 in the stock of the Peoples Gas Light and Coke Company yesterday filed a bill against its president, A. M. Billings, C. K. Garrison and W. R. Garrison, the West Chicago Gas Company; Samuel G. Wheeler, Jr., of New York, and the Union Trust Company, of New York. The complaint alleges that Billings and the Garrisons, as directors and principal stockholders, illegally issued and sold $4,600,000 in mortgage bonds of the company; that there are certain large amounts of stock held by them on which no assessments have been paid, while the other stockholders have been forced to pay; that the large surplus earned by the company was put into the custody of a bank owned by the defendants; that no dividends have been paid for eight years, although the company has been making large sums, and that the defendants have sought to lease the use of the company's pipes to the West Chicago Gas Company, alleged to be controlled by the defendants, to the damage of the complainants. They ask for a receiver, for an accounting, and for the cancellation of the bonds illegally issued.

Fond du Lac's Towers Heard from Once More.—On May 12, we announced that one of the electric light towers at Fond du Lac, Wis., was leveled to the ground during the prevalence of a storm of wind on the night of April 14. We also predicted, at the time, that some of the other structures of a similar nature would probably come down in the same manner. Well, this prediction is now verified. On the morning of July 16, the principal electric light tower, situated in the center of the town, suddenly tumbled. One portion of it, a piece weighing about 500 pounds, crashed through the roof of a saloon, demolishing a stove at which a woman was cooking; strange to say, she escaped injury. The loss is put at $2,000. It might be added here that no storm of any kind prevailed at the time. Wonder how long before New York will have a similar experience.

The authorities have at last reached the sapient conclusion, from the evidence presented, that it is no longer safe to trust the towers which still remain in position. The Mayor of Fond du Lac telegraphed the Elgin Tower Company (the contractors who erected them) ordering the structures to be taken down. The tower company made no response, and so the city authorities, to guard against further accidents, are bolstering them (the towers) with guy rods. They never had to put "guys" around the lamp-posts. Moral, go back to gas; or better still, never "go back" on gas.

Price of Gas Reduced in Oshkosh, Wis.—Mr. John Rogers, the enterprising and popular manager of the Oshkosh (Wis.) Gas Light Company has notified us that the price of gas has been reduced from $3.50 to $2.50 per 1,000 feet, and that the result is readily shown in the already greatly increased send-out.

Troy (N. Y.) in Darkness.—The "arc" lights in the streets of Troy (N. Y.) form no exception to the general rule. They all went out, probably "struck" in sympathy with the telegraph operators, and did not exhibit

their "pale effulgence" for several nights. The Fond du Lac moral might also be applied here.

FIRE AT THE WORKS OF THE YONKERS (N. Y.) GAS LIGHT COMPANY.—On the morning of July 18, a fire occurred at the works of the Yonkers Gas Light Company which was caused by an explosion of naphtha. This company manufactures water gas, and the naphtha employed is delivered to the works in tank-cars, and then transferred to the receiving tank of the gas company by means of a steam pump. A train of tank-cars arrived at the gas works on the morning of the 17th, and the work of unloading was begun on the 18th. The man who had charge of arrangements, and known as Charley Woods, turned on steam, but the pump did not start right. Instead of opening a small vent-cock, he took out a three-quarter inch plug while the pump was working. The result was that a stream of naphtha flew over the man's shoulder to the boiler fire, and in an instant he was enveloped in a sheet of flame. His screams brought Superintendent Slade to his assistance, who by prompt action succeeded in smothering the flames around Wood's person, and shut off the further escape of naphtha. The roof of the boiler-house and adjoining coal shed had, in the meanwhile, caught fire, but the conflagration was soon brought under control. The damage occasioned will be about $5,000; but the property is fully insured. The man Woods died some two or three days afterwards from the injuries received. Another man named Delaney was slightly burned.

IT DID NOT LAST LONG.—The Fulton Municipal, Standard Oil Gas Company, of Brooklyn, N. Y., have, it is stated, made overtures looking to a cessation of the fight lately inaugurated in the city of churches. The consumers' joy did not last long.

THE PINTSCH SYSTEM OF GAS LIGHTING.—The gold medal awarded by the "General Exposition for Hygienic and Life Saving Service," was presented to Mr. Pintsch by the Crown Prince of Germany, in person. Appropos of this we understand the United States Government purchased the Pintsch lighted buoy now over the wreck of the Nankin, in the lower bay of the harbor of New York, and has ordered three more, of a larger size, which will be placed in the water during the coming fall.

The Suez canal, at its entrance, is to be lighted by the Pintsch system of compressed gas, eight buoys and three stationary lights ordered by the authorities being now on the way to Port Said.

The remarkable success attending the introduction of gas lighting on the railroads of this country and Europe, is due to the same inventive genius which has overcome the obstacles in lighting the path of the mariner.

ELECTRIC LIGHT FOR ROCHESTER, N. Y.—On July 10, the City Council of Rochester, N. Y., received a communication from Mayor Parsons and City Attorney Beckley, to whom was referred the matter of drafting a "suitable contract" with the Brush Electric Light Company. The officials named decided that "it was to the best interest of the city" to enter into a contract, covering a period of five years, and ending July, 1883, with the electric lighting company above named. The price to be paid for each electric light is to be 45 cents per night. The recommendation was adopted and the Council authorized that the contract be entered into. This result was reached despite the fact that the Rochester Gas Light Company offered to light with gas all streets on the west side of the river reached by its mains, with burners consuming five feet per hour, for six cents per lamp per night. The company further explained that the burner now in use consumes only 3½ feet per hour, and that the proposed five-feet burner would add 50 per cent. to the light of each lamp. The company also expressed its willingness to retain the present 3½ feet burner at a cost of 4½ cents per lamp per night, thus making the cost of one electric light equal to that of ten gas lamps. Rochester must be a wonderfully progressive place when it can afford to pay such a price for street lighting as that agreed upon in the electric light contract; or can it be possible that the stock of the electric light company was placed where "it would do the most good"—say, for instance, that some portion of it was "lost" in the vicinity of the Council Chamber?

PIPE FOR THE PHILADELPHIA GAS TRUST.—A contract for 10,000 lengths of 4-inch pipe was lately awarded to A. H. McNeal, of Burlington, N. J., by the Philadelphia Gas Trust officials; price, 3½ cents per pound.

The Market for Gas Securities.

The market for city and out-of-town shares is at a standstill—no business being reported in any locality that is worth mentioning. Prices maintain their strength, but transactions are few and far between. It is rumored that the "war" in Brooklyn is virtually "over," and that considerable figuring is being indulged in as to what should be a proper basis for the consummation of the "deal." The Metropolitan Company, of New York city, declared a dividend of 6 per cent., payable August 14; the Harlem Company also declared a dividend of 3 per cent., payable August 1. The Williamsburgh Company, of Brooklyn, N. Y., paid a dividend of 2 per cent., on July 15. This company has paid no dividend for eighteen months previous, and the one lately declared gives a return to the shareholders at the rate of one and three-tenths cents per annum. The stockholders not "in the ring" must feel very exuberant just now; in fact they must be in a state of mind similar to the colored preacher, who, having sent his hat around for a contribution, and finding it empty when returned to him, exclaimed, "Bress de Loard, I have got my hat back." We note a sale at auction of 15 shares New York City Gas, at 126.

Correspondence

[The JOURNAL is not responsible for the opinions expressed by correspondents.]

Eighteen Year Old Journalists.

BOSTON, MASS., July 24, 1883.

To the Editor AMERICAN GAS LIGHT JOURNAL:

It is generally understood, at least by people engaged in the manufacture and supply of illuminating gas, that when a young man applies to an editor of a newspaper for employment as a reporter, that the first instruction received by the tyro is to "pitch into the gas company." If the article so written contains a large amount of abuse, and otherwise is a series of misstatements concerning the price charged; the presentation of bills for large amounts "when the house has been closed, and the people away in the country;" the mode of manufacture, the entire failure and utter unreliability of the meter; the impudence of the collector in asking for the payment of the last months bill, as also the insulting language used by the said collector in reference to the unpaid bills of the two previous months; the unfeeling replies of the office clerks, when asked to explain "how is it that my gas bill is so much more than my neighbor's;" and the still worse treatment received at the hands of the president or secretary of the company, when appealed to because of the large amount of the bill; and the final sentence of the article, wherein the gas company is denounced as "a den of thieves"—then the young man is understood to possess the necessary qualifications which make a reporter; and who, if he "works up" other subjects containing as many facts (?) as he got together in his article on gas, will, in time, become fitted to write on all the important topics of the day—and with the more than likely result that the other effusions will contain just as much truth, and be just as reliable, as the article on gas.

Now, Mr. Editor, I desire to ask of you, as a man thoroughly acquainted with all the scientific subjects of the day, if there is as much ignorance displayed by writers upon these questions, as you and I know that there is shown on the manufacture and distribution of illuminating gas? If you reply that the articles on other subjects are probably written by patient, painstaking and unprejudiced men, after careful investigation of facts and figures, presented by those who have been engaged, it may be for years, in collecting the facts—then, I must in turn ask, "Why are not such men employed to write up the true facts in regard to the manufacture and sale of illuminating gas?"

The fact is, Mr. Editor, that there is altogether too much loose talk, and too little common sense displayed by those who attempt to write upon subjects of which they know very little, and that which they do know is conveyed to their readers in language serving rather to befog than to enlighten; in short, to use the words of one of New York's famous editors, "There is too much eighteen year old journalism." NAMSAG.

Letter from Valparaiso, South America.

VALPARAISO, S. A., June 20, 1883.

To the Editor AMERICAN GAS LIGHT JOURNAL:

In the columns of your issue of May 16, I find an article announcing the appointment of Mr. James Merriman, of Pictou, Nova Scotia, as manager of the gas works of Vera Cruz (Mexico) accompanied by a statement to the effect that said gentleman had built works in Valparaiso, Copiapo and Iquique in South America.

Under the belief that you are open to receive rectifications of any misstatements that may appear in your JOURNAL, I take the liberty of calling your attention to the fact that you have been misinformed in relation to Mr. Merriman's operations in Chili. Both the gas works in Valparaiso, as also the Copiapo works, were erected by my father, the late Mr. Samuel Wallace. I may furthermore add that no person of the name of Merriman has been attached to the staff of either of the Valparaiso works at any time. As to his having erected the Iquique works or having been employed in the Copiapo establishment I could not at the present give any authentic information, but entertain my doubts that such has been the case as, in spite of my long connections *in the line* on this coast, cannot recollect having heard the name mentioned.

Considering that my personal interests, and not the mere spirit of contradiction, have influenced me to take notice of this matter, the reproduction of my remarks in your columns would much oblige, Your truly,

ANDREW T. WALLACE, Eng'r of Valparaiso Gas Works.

[The source from whence we received the information as to Mr. Merriman's connection with the different South American gas enterprises, mentioned in the "item" referred to by our correspondent, was Mr. Merriman himself.—*Ed.*]

Gas Stocks.

Quotations by Geo. W. Close, Broker and Dealer in Gas Stocks (with W. B. Scott & co.,)

34 Pine Street, New York City.

August 2, 1883.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

	Capital.	Par.	Bid	Asked
Central	$466,000	50	85	90
Harlem	1,800,000	50	103	106
" Bonds	170,000		—	—
Manhattan	4,000,000	50	230	235
Metropolitan	2,500,000	100	186	192
" Bonds	658,000	—	105	110
Mutual	3,500,000	100	116	120
" Bonds	1,500,000	1000	103	105
Municipal	3,000,000	100	180	182
" Bonds	750,000		102	104
New York	4,000,000	100	124	—
Northern	125,000	50	—	95
" Scrip	108,000			
Gas Co's of Brooklyn.				
Brooklyn	2,000,000	25	112	—
Citizens	1,200,000	20	69	73
" S. F. Bonds	320,000	1000	105	107
Fulton Municipal	1,500,000	100	73	—
Peoples	1,000,000	10	45	50
" Bonds	290,000	—	104	107
" "	250,000	—	88	90
Metropolitan	1,000,000	100	80	85
Nassau	1,000,000	25	50	60
" Ctfs	700,000	1000	90	93
Williamsburgh	1,000,000	50	73	—
" Bonds	1,000,000	—	100	101
Richmond Co., S. I.	300,000	50	—	75
" Bonds	40,000	—	—	—
Out of Town Gas Companies.				
Buffalo Mutual, N. Y.	750,000	100	72	75
" Bonds	200,000	1000	95	100
Citizens, Newark	918,000	50	80	85
" " Bonds	124,000	—	105	10
Chicago Gas Co., Ills			150	155
Cincinnati G. & C. Co.			178	180
Consolidated, Balt.			42½	43
" Bonds			105	106
Central, S. F., Cal.			45	—
Capital, Sacramento, Cal			—	56½
Hartford, Conn	750,000	25	116	120
Jersey City	750,000	20	155	165
Laclede, St. Louis, Mo.	1,600,000	100	100	105
Montreal, Canada	2,000,000	100	186	187
New Haven, Conn		25	152	160
Oakland, Cal			—	29¾
Peoples, Jersey City		—	72	75
" " Bonds			—	—
Paterson, N. J		25	96	99
Rochester, N. Y		50	70	80
Washington, D. C	2,000,000	20	175	—
Wilmington, Del		50	174	—
Yonkers		50	33	35
St. Louis, Missouri	600,000	50	250	254
San Francisco Gas Co. San Francisco, Cal.			59¼	60

Advertisers Index.

	Page
GAS ENGINEERS.	
E. McMillin & Co., Ironton, Ohio	71
Jos. R. Thomas, New York City	62
GAS WORKS APPARATUS AND CONSTRUCTION.	
James R. Floyd, New York City	67
T. F. Rowland, Greenpoint, L. I	67
Delly & Fowler, Phila., Pa	67
Kerr Murray Mfg. Co., Fort Wayne, Ind	67
Stacey Mfg. Co., Cincinnati, Ohio	67
Bartlett, Hayward & Co., Baltimore, Md	67
Morris, Tasker & Co., Limited, Phila., Pa	67
Davis & Farnum Mfg. Co., Waltham, Mass	62
GAS AND WATER PIPES.	
A. H. McNeal, Burlington, N. J	66
Gloucester Iron Works, Phila., Pa	66
James Marshall & Co., Pittsburgh, Pa	66
R. D. Wood & Co., Phila., Pa	66
Warren Foundry and Machine Co., Phillipsburgh, N. J	66
Mellert Foundry and Machine Co., Reading, Pa	66
SCRUBBERS AND CONDENSERS.	
G. Shepard Page, New York City	65
RETORTS AND FIRE BRICK.	
J. H. Gautier & Co., Jersey City, N. J	64
B. Kreischer & Sons, New York City	64
Adam Weber, New York City	64
Laclede Fire Brick Works, St. Louis, Mo	64
Brooklyn Retort and Fire Brick Works, Brooklyn, N. Y.	64
Borgner & O'Brien, Phila., Pa	64
Gardner Brothers, Pittsburgh, Pa	64
Henry Maurer, New York City	64
Evens & Howard, St. Louis, Mo	64
Chicago Retort and Fire Brick Works, Chicago, Ills	64
Taylor and Anderson, Cincinnati, Ohio	64
DIETERICH'S REGENERATOR FURNACE.	
Charles F. Dieterich, Baltimore, Md	38
GAS STOVES.	
American Meter Co., New York and Philadelphia	63
The Goodwin Gas Stove and Meter Co., Philadelphia, Pa	72
VALVES.	
Ludlow Valve Manufacturing Co., Troy, N. Y.	66
GAS METERS.	
Harris, Griffin & Co., Phila., Pa	70
American Meter Co., New York and Philadelphia	71
The Goodwin Gas Stove and Meter Co., Phila. Pa	71
Helme & McIlhenny, Phila., Pa	71
Maryland Meter and Mfg. Co., Baltimore, Md	70
D. McDonald & Co., Albany, N. Y	71
EXHAUSTERS.	
P. H. & F. M. Roots, Connersville, Ind	69
Smith & Sayre Manufacturing Co., New York City	68
PROCESSES.	
Strong Gas and Fuel Co., Yonkers, N. Y	61
Thomas B. Fogarty, New York City	70
GAS COALS.	
Penn Gas Coal Co., Phila., Pa	69
Perkins & Co., New York City	68
Cannelton Coal Co., New York and Philadelphia	69
Newburgh Orrel Coal Co., Baltimore Md	69
Despard Coa Co., Baltimore, Md	69
Fort Pit Gas Coal, Pittsburgh, Pa	69
Chesapeake and Ohio R.R Coal Agency, N. Y. City	69
Westmoreland Coal Company, Phila., Pa	69
Breckenridge Cannel (Perkins & Co.), N. Y. City	68
GAS ENGINES.	
Shleicher, Schumm & Co., Phila., Pa	48
STREET LAMPS.	
J. G. Miner, Morrisania, New York City	40
PURIFIER SCREENS.	
John Cabot, Lawrence, Mass	37
BURNERS.	
G. Gefrorer, Phila., Pa	66
G. Shepard Page, New York City	68
PURIFYING MATERIAL.	
Connelly & Co., New York City	71
STEAM BLOWER FOR BURNING BREESE.	
H. E. Parson, New York City	32
GAS FIXTURES.	
Mitchell, Vance & Co., New York City	67
CEMENT.	
F. O. Norton, New York City	71
TAR BURNER AND TAR VALVE.	
S. H. Douglas, Ann Arbor, Mich	68
STEAM ENGINES.	
Westinghouse Machine Co., Pittsburgh, Pa	62
FOR SALE.	
Gardner Brothers, Lockport, Pa	61

FOR SALE.

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Established in 1864. Situated at Lockport Station, on the P. R. R., 60 miles from Pittsburgh, Pa. The Works consist of complete plant for manufacturing Clay Gas Retorts, Settings, Blocks, Tiles, and Fire Brick. Capacity, about 100 retorts, with necessary settings, and 100,000 fire brick per month. Clay and coal mined by ourselves within short distance of Works and hauled in wagons. Over three acres of land, with all necessary buildings, a number of tenements and town lots. The P. R. R. has side track alongside our kilns. Good trade established. Our good will and influence to go with sale. Statement of business done will be shown to responsible parties desiring to purchase. Any further information desired will be cheerfully given by Gardner Bros., Lockport, Pa.

ALSO,

Gardner Bros. "Standard Savage" Fire Brick Works.

Established in 1873. Situated at Ellerslie Station, Md., on Balt. & O. R. R.; also on Bedford Branch of P. R. R. Has convenient shipping arrangements on both roads. Works consist of two independent plants of machinery, so constructed and arranged that they can be run separately or together. One of the buildings entirely new, erected last year. Capacity of Works, over 14,000 bricks per day. Mount Savage Clay in abundance, mined on royalty, and delivered direct into Works by gravity. Inclined plane and tramroad, large portion of which was laid with new T-rail last year. New artesian well, capacity over 35 barrels per hour; also mountain stream delivering water by gravity into tanks at Works. Seven acres of land, with 9 good tenements. Everything in first-class order for manufacturing and shipping brick direct from kilns into cars. Good and growing trade established. Brick unquestionably as good as the best made of Mount Savage Clay. Statements of business done will be shown to responsible parties desirous of purchasing. Our good will and influence to go with sale. Any further information desired will be cheerfully given by Gardner Bros., Lockport, Pa.

CIRCULAR TO GAS LIGHT COMPANIES.

Branch Office of the Strong Gas Fuel and Light Company,
Corner Broadway and Main Street, Yonkers, July 2, 1881.

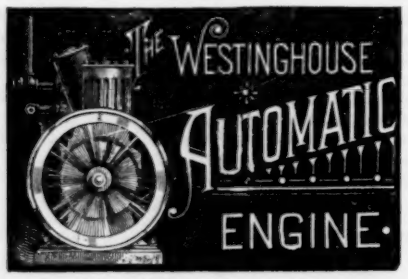
The Yonkers Fuel Gas Company is now in successful operation, manufacturing Water Gas by the Strong Process, for Heat, Power, and Light.

It has about two and a half miles of mains already in use through the heart of the city of Yonkers, and is supplying gas for cooking, heating, and various industrial purposes.

The problem of a purely fuel gas is at length practically solved, and is a complete success. That it must speedily go into universal use is apparent to everyone.

Gas Light Companies are cordially invited to visit Yonkers and inspect this new system, which, if electricity *should* eventually drive them out of the field of illumination, will open to them another field still more vast and fruitful, and from which they never can be dispossessed. The Westchester Gas Light Company of the city of Yonkers employes the Lowe Process for making its gas. Here, then, can be seen, side by side in business competition, the Strong and the Lowe against the Motay and the old coal gas methods, and each observer will be enabled to form his own opinion as to their relative power and value. The Strong Gas Fuel and Light Company is the proprietor for the State of New York of the Strong Patents, five in number, and of the Lowe Patents, two in number. All applications for licenses or for information should be addressed, as above, to

R. W. VAN PELT, *President of the Company,*
And also President of the Yonkers Fuel Gas Co., and of the Westchester Gas Light Co.



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JOS. R. THOMAS, C.E.,

May be Consulted on all Matters Relating to Gas Works and Gas Manufacture.

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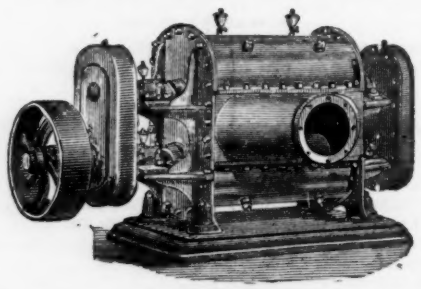

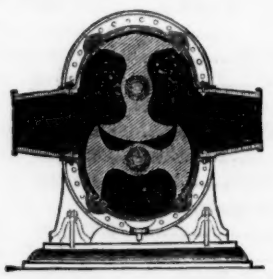

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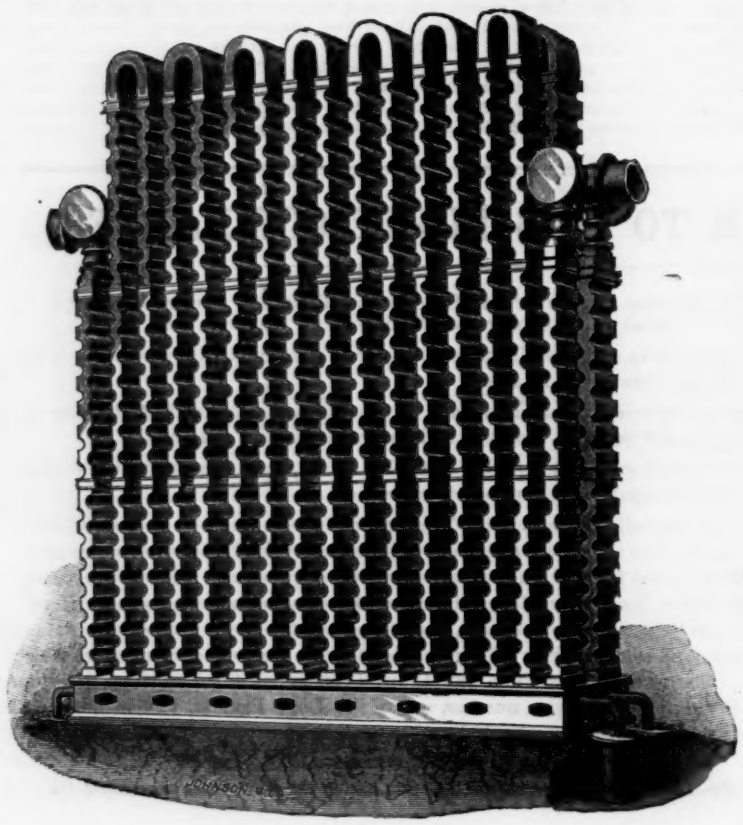

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